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PC WORLD

AUGUST 1989 $2.95 CANADA $3.95

GOODBYE, LASERJET!

POSTSCRIPT PRINTERS BEAT HP FOR TOP-NOTCH DOCUMENTS

LOW-COST 25-MHz 386s

Red-Hot Performers, Priced to Sell

COMMUNICATIONS SOFTWARE

Best Buys for Under $99

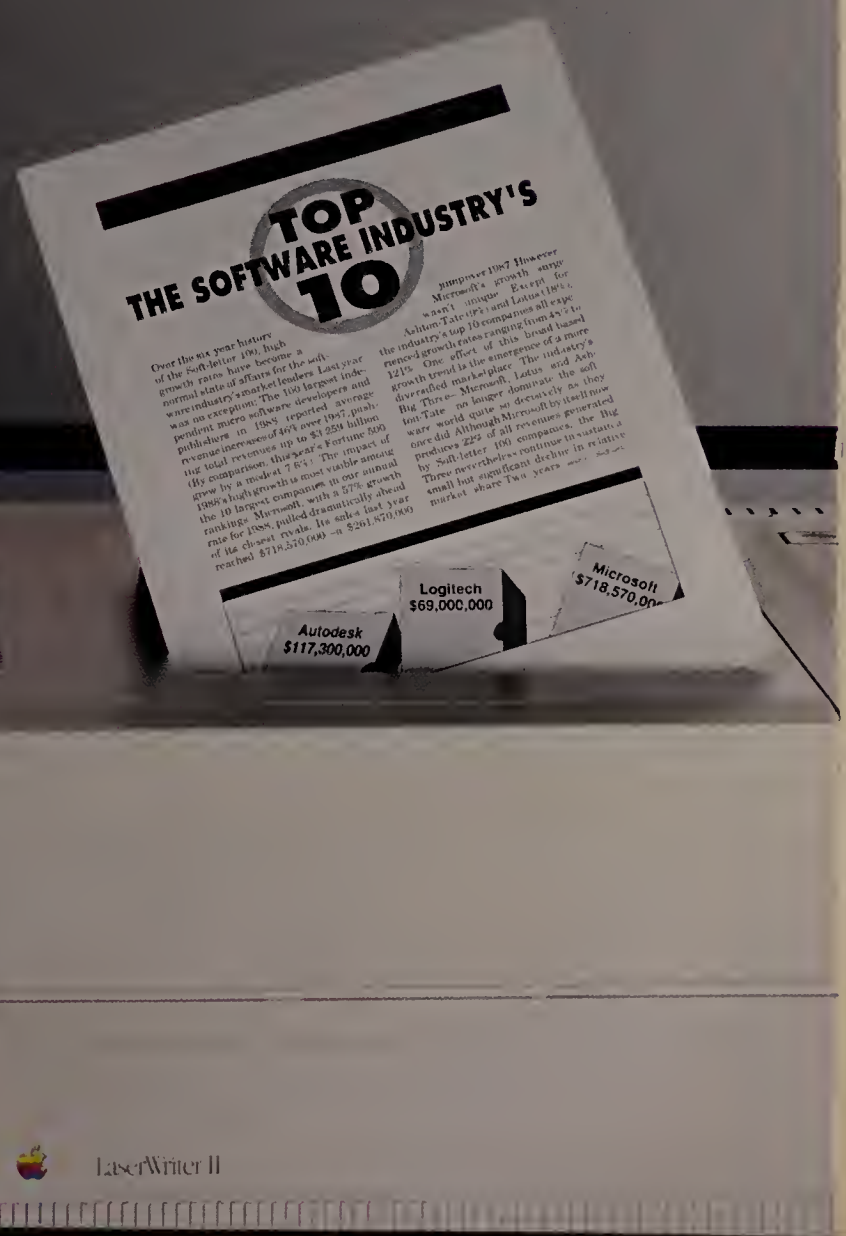
PREVIEW

NetWare Harnesses the 386

BUYERS' GUIDE

Power Tools for Programmers

WHY YOUR COMPANY NEEDS A BBS



Technically speaking, the System 325 is the most advanced 386™ computer we've ever built. And, according to PC Magazine, it's one of the most advanced 386 computers they've ever tested.

In benchmark after benchmark, the Dell System 325 25 MHz ran circles around a field of 386-based systems. A field that included the Compaq^ 386/25.

A show of prowess that earned the System 325 PC Magazine's Editor's Choice award.

It was a goal we set for ourselves from the very beginning. And an objective anyone with a penchant for power and performance can appreciate.

A PERSONAL COMPUTER THAT'S REALLY PERSONAL.

Of the more than 150,000 personal computers we've sold to date, each one's been individually configured to fit the needs of its owner.

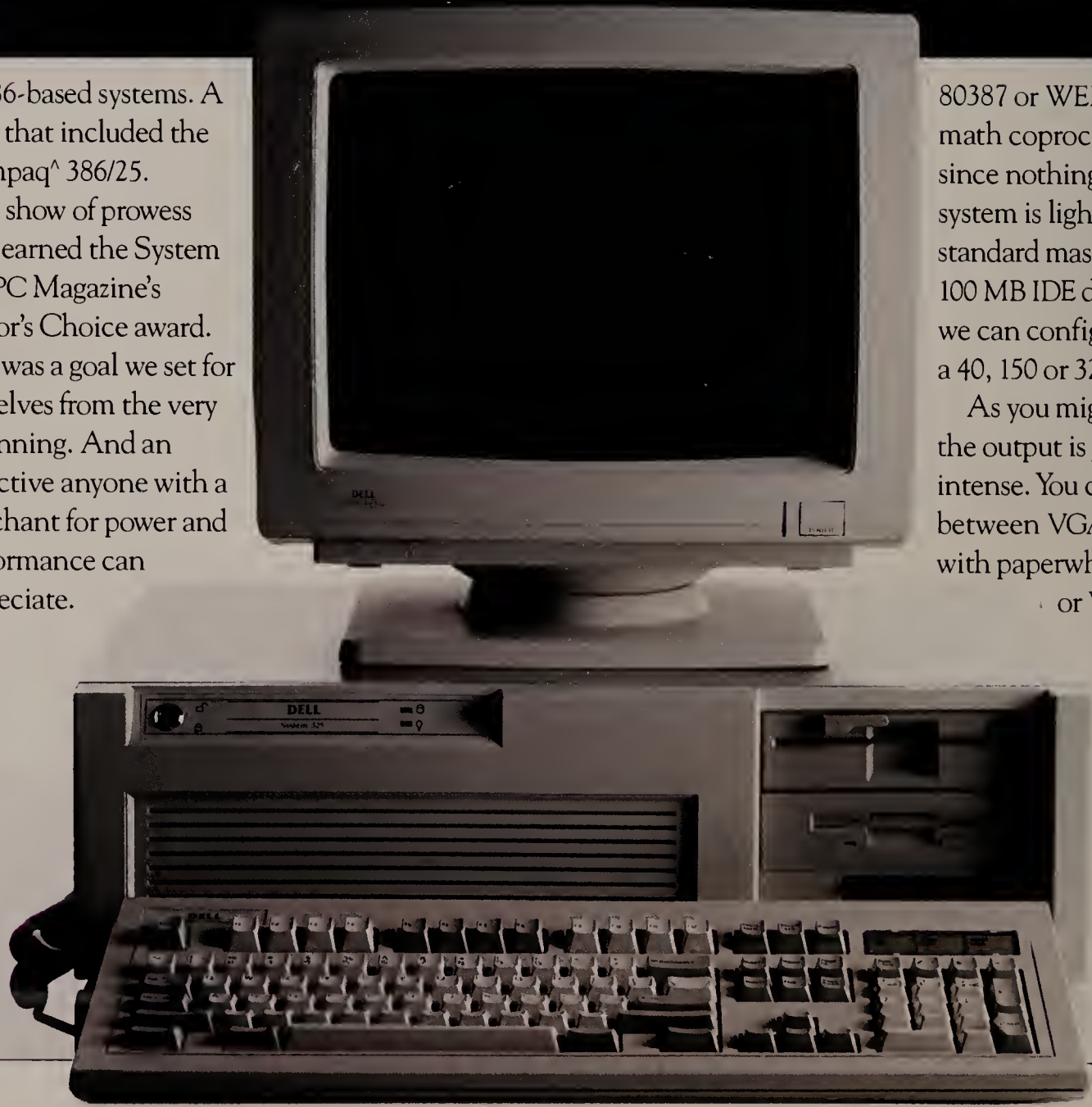
The System 325 takes that idea to its logical extreme.

For example, it runs either MS-DOS,® OS/2, or our own Dell UNIX® System V. Which is compatible with AT&T's System V Interface Definition. And the world of XENIX® applications.

If speed is of the essence, we can include an optional Intel^ 80387 or WEITEK 3167 math coprocessor. And since nothing about this system is lightweight, the standard mass storage is a 100 MB IDE disk drive. Or we can configure it with a 40, 150 or 322 MB unit.

As you might expect, the output is just as intense. You can choose between VGA mono with paperwhite screen, or VGA Color

THE DELL 386 SYSTEM 325 HAS A 25 MHz CLOCK RATE, CACHE MEMORY CONTROLLER, IDE OR ESDI HARD DISK DRIVE, PAGE MODE INTERLEAVED MEMORY, AND 100% COMPATIBILITY WITH MS-DOS, OS/2 AND UNIX SYSTEM V.



Plus, for high resolution colors displayed on a larger screen.

Even though the 325 gives you all this performance, it still leaves you six open slots for whatever else you might want to add.

And once you've told us what you want, we'll make sure what you want works—by burning-in the entire system unit.

COMPUTER RETAILERS ARE NO KNOWS.

In all probability, the average computer retailer won't have any understanding what makes the System 325 go.

He will, however, be quite aware of the fact that he could add a 35% markup if he could sell it in his store.

Which he can't.

Because we sell direct.

Meaning you now have the unique opportunity to talk directly with a computer expert. And ask things like, "What's the difference between IDE and ESDI?" Or, "How much SIMM RAM should I add?"

In other words, the kinds of questions you should be able to ask a retailer, but usually can't.

So as you might suspect, dealing direct not only saves you the 35% markup, but 100% of the aggravation.

WE COME WHEN WE'RE CALLED.

One of the things that very clearly sets a Dell system apart from other computers is not just how they're sold, but how they're supported.

Overkill was one description used in a PC Week article.

Perhaps.

But then, we think you'll agree, when something goes wrong, you want as much help as possible, right?

Which is why every Dell system comes with a toll-free technical support line and self-diagnostic software. We're able to solve 90% of all problems right over the phone. The other 10% receive next-day, deskside service. Thanks to our new alliance with Xerox Corporation.

And you get all this help for a full year—whenever you need it—at no extra charge.△

As you've probably guessed, one of the things that drives us most is customer satisfaction.

So we'd like to give you the ultimate guarantee: Try a System 325 in your office for a month. Run your toughest applications. Put it through its paces, at your pace. If you're not completely satisfied, send it back anytime within 30 days. And we'll refund your money.

No questions asked.

MAYBE YOU SHOULDN'T BUY ONE AFTER ALL.

No matter how many reasons we give you to buy a Dell system, sometimes it makes more sense to lease one instead.

BEST OF ALL, YOU WON'T HAVE TO EXPLAIN TO A COMPUTER RETAILER WHAT ALL THAT MEANS.

Whether you need a single computer, or an office full, a leasing plan is like 100% financing.

And just as we can custom configure your computers, we can see to it you get a custom designed lease plan to fit your exact business needs.† A fact that has not gone unnoticed. Especially by the Fortune 500. Over half of whom now own or lease Dell systems.

And just as we welcome their business, we welcome your business, too. Just call us, toll-free. And don't be afraid to ask us the tough questions.

That's the part we like best.

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FOR DELL IN CANADA, CALL 800-387-5752

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DOT MATRIX PRINTERS.

Printer System 800: $699.95
Our highest resolution text and graphics, 24-pin dot matrix printer. Draft quality at 200 cps. Letter quality at 66 cps. Parallel and serial interfaces. Wide carriage.

Printer System 300: $199.95
9-pin dot matrix. Draft quality at 144 cps. Near-letter quality at 36 cps. Four standard fonts. Parallel interface. Narrow carriage.

NEW MONITOR

Dell Super VGA Color Monitor. Supports all VGA modes plus new 800 x 600 standard. Call for details.

LASER PRINTERS.

SO HOW COME YOU NEVER CALL?

THE DELL SYSTEM 325 25 MHz 386

PC MAGAZINE EDITOR'S CHOICE

"The new top-of-the-line Dell System 325 is a flagship worth putting out in front of the fleet."
February 14, 1989

STANDARD FEATURES:

- Intel 80386 microprocessor running at 25 MHz.
- Choice of 1 MB, 2 MB or 4 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 25 MHz Intel 80387 or 25 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

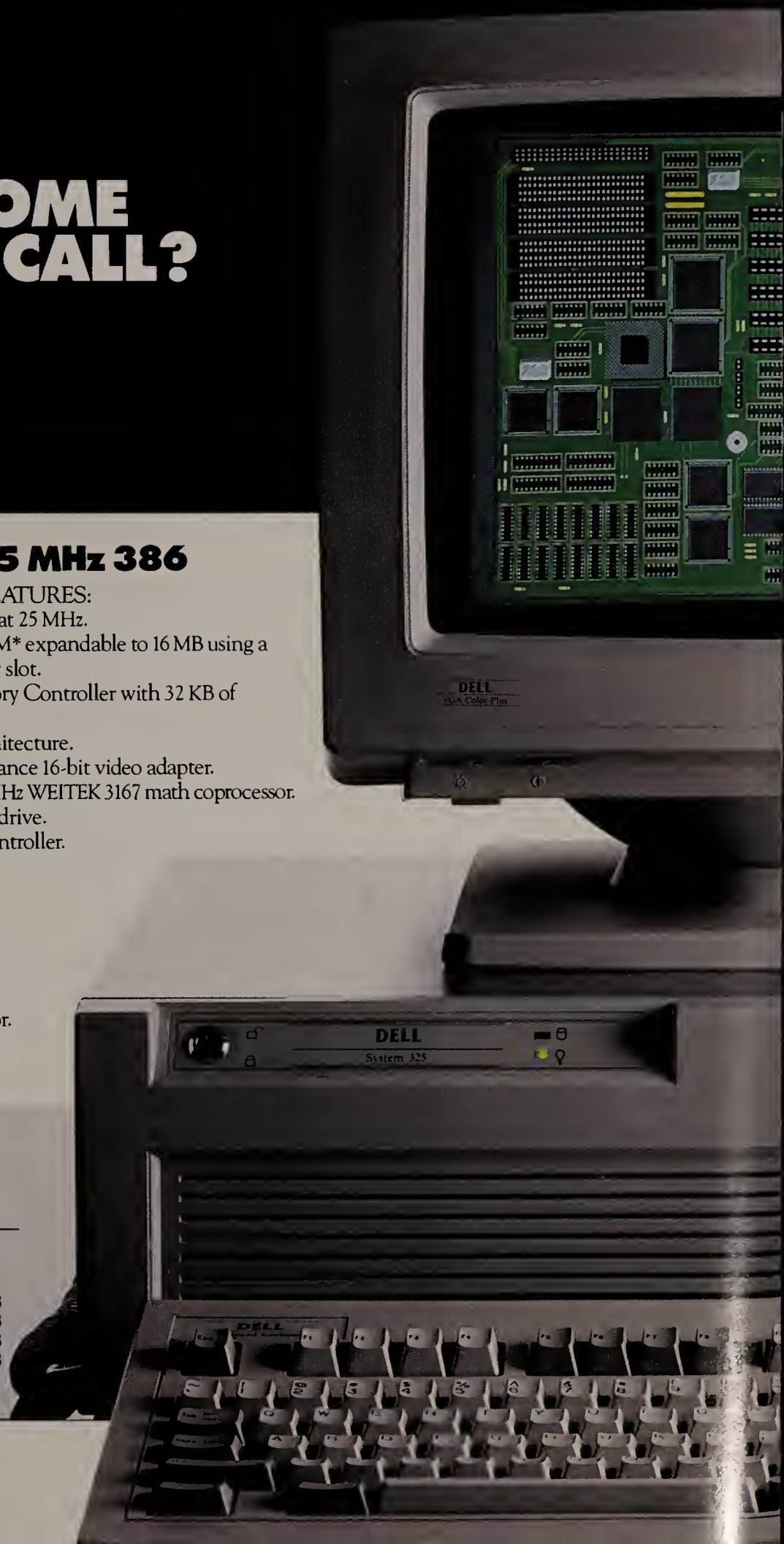
OPTIONS:

- 40 MB or 150 MB tape backup.
- 25 MHz Intel 80387 math coprocessor.
- 25 MHz WEITEK 3167 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.
- Graphics Performance Accelerator GPX-1024.
- Graphics Performance Display GPD-16C, GPD-19C.

Lease for as low as $199/Month.
◊ Extended Service Plan pricing starts at $370.

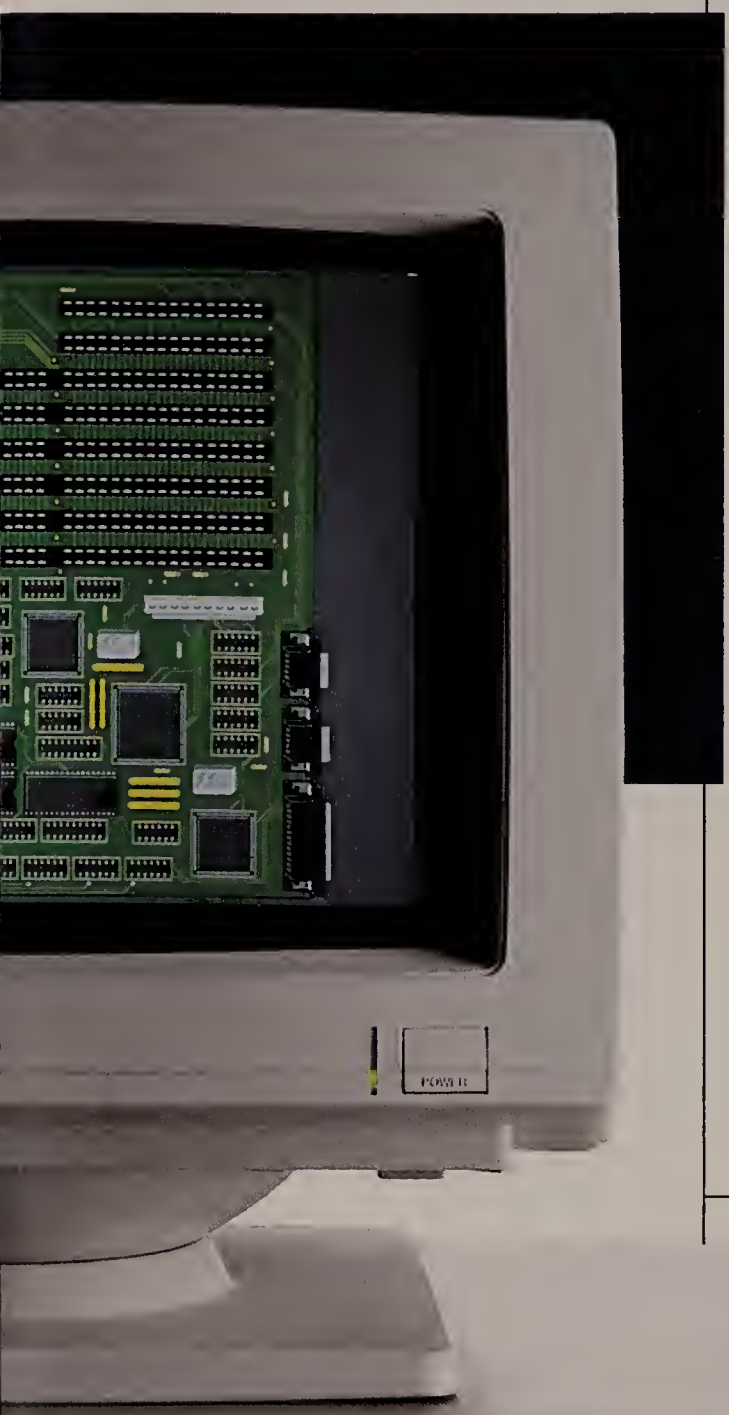
System 325	With Monitor & Adapter			
	VGA Mono		VGA Color Plus	
Hard Disk Drive	1MB RAM	2MB RAM	1MB RAM	2MB RAM
40 MB-29 ms IDE	$5,499	$5,698	$5,799	$5,998
100 MB-25 ms IDE	$5,999	$6,198	$6,299	$6,498
150 MB-18 ms ESDI	$6,499	$6,698	$6,799	$6,998
322 MB-18 ms ESDI	$7,299	$7,498	$7,599	$7,798

Disclaimer: All systems are photographed with optional extras, which some computer retailers won't even recognize.



Laser System 150, 15 pages per minute: $5,995.
Laser System 80, 8 pages per minute: $3,295.
Laser System 60, 6 pages per minute: $2,195.

All Dell laser printers come with 1.5 MB RAM, full-page 300 DPI graphics, and have 31 standard fonts (7 resident and 24 downloadable from diskette). Dell laser printers also provide Hewlett-Packard LaserJet Plus,^ Epson/FX,^ IBM Proprinter^ and Diablo 630^ emulations.



THE DELL SYSTEM 310 20 MHz 386.

The best combination of performance and value available.

STANDARD FEATURES:

- Intel 80386 microprocessor running at 20 MHz.
- Choice of 1 MB, 2 MB or 4 MB of RAM* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 20 MHz Intel 80387 or 20 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 40 MB or 150 MB tape backup
- 20 MHz Intel 80387 math coprocessor.
- 20 MHz WEITEK 3167 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.
- Graphics Performance Accelerator GPX-1024.
- Graphics Performance Display GPD-16C, GPD-19C.

***Lease for as low as $135/Month.
◊ Extended Service Plan pricing starts at $251.***

System 310	With Monitor & Adapter			
Hard Disk Drives	TTL Mono		VGA Color Plus	
	1 MB RAM	2 MB RAM	1 MB RAM	2 MB RAM
40 MB-29 ms IDE	$3,699	$3,898	$4,199	$4,398
100 MB-25 ms IDE	$4,199	$4,398	$4,699	$4,898
150 MB-18 ms ESDI	$4,699	$4,898	$5,199	$5,398
322 MB-18 ms ESDI	$5,499	$5,698	$5,999	$6,198

THE NEW DELL SYSTEM 316 16 MHz 386SX.™

Expandable, affordable access to 386 architecture.

STANDARD FEATURES:

- Intel 80386SX microprocessor running at 16 MHz.
- Choice of 1MB, 2 MB or 4 MB of RAM* expandable to 16MB (8 MB on the system board).
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter
- LIM4.0 support for memory over 1 MB.
- Socket for 16 MHz Intel 80387SX math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface and diskette controller on system board. (ESDI based systems include a hard disk controller.)
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

OPTIONS:

- 40 MB or 150 MB tape backup.
- 16 MHz Intel 80387SX math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- Graphics Performance Accelerator GPX-1024.
- Graphics Performance Display GPD-16C, GPD-19C.

***Lease for as low as $112/Month
◊ Extended Service Plan pricing starts at $234.***

System 316	With Monitor & Adapter			
Hard Disk Drives	TTL Mono		VGA Color Plus	
	1 MB RAM	2 MB RAM	1 MB RAM	2 MB RAM
40 MB-29 ms IDE	$2,999	$3,198	$3,499	$3,698
100 MB-25 ms IDE	$3,599	$3,798	$4,099	$4,298
150 MB-18 ms ESDI	$4,099	$4,298	$4,599	$4,798
322 MB-18 ms ESDI	$4,899	$5,098	$5,399	$5,598

THE DELL SYSTEM 200 12.5 MHz 286.

This full-featured 286 computer runs at 12.5 MHz, and is completely Microsoft MS-DOS and MS OS/2 compatible.

STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB (4.6 MB on system board).
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 6 industry standard expansion slots.

OPTIONS:

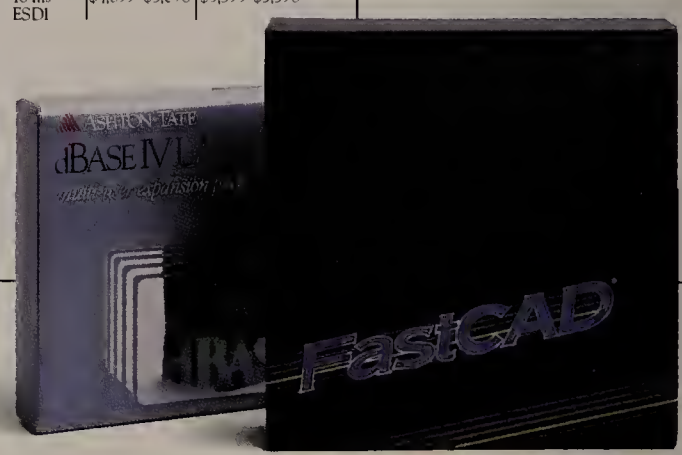
- 40 MB or 150 MB tape backup.
- Intel 80287 math coprocessor.
- 512 KB RAM upgrade kit.
- 2 MB RAM update kit.

***Lease for as low as $64/Month.
◊ Extended Service Plan pricing starts at $166.***

System 200	With Monitor & Adapter	
Hard Disk Drives	TTL Mono	VGA Color
20 MB	$1,699	$2,099
40 MB-29 ms IDE	$1,999	$2,399
100 MB-25 ms IDE	$2,599	$2,999
150 MB-18 ms ESDI	$3,099	$3,499
322 MB-18 ms ESDI	$3,899	$4,299

Performance Enhancements (Systems 325, 310 and 316) Within the first megabyte of memory, 384 KB of memory is reserved for use by the system to enhance performance.

4 MB configurations available on all systems. Call for pricing.



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Dell Enhanced Microsoft MS-DOS 4.01: $119.95.
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Dell Enhanced MS® OS/2 Standard Edition 1.0: $324.95.
Dell UNIX® System V/386, Release 3.2:
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That's the part we like best.

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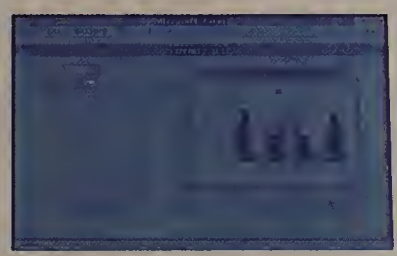

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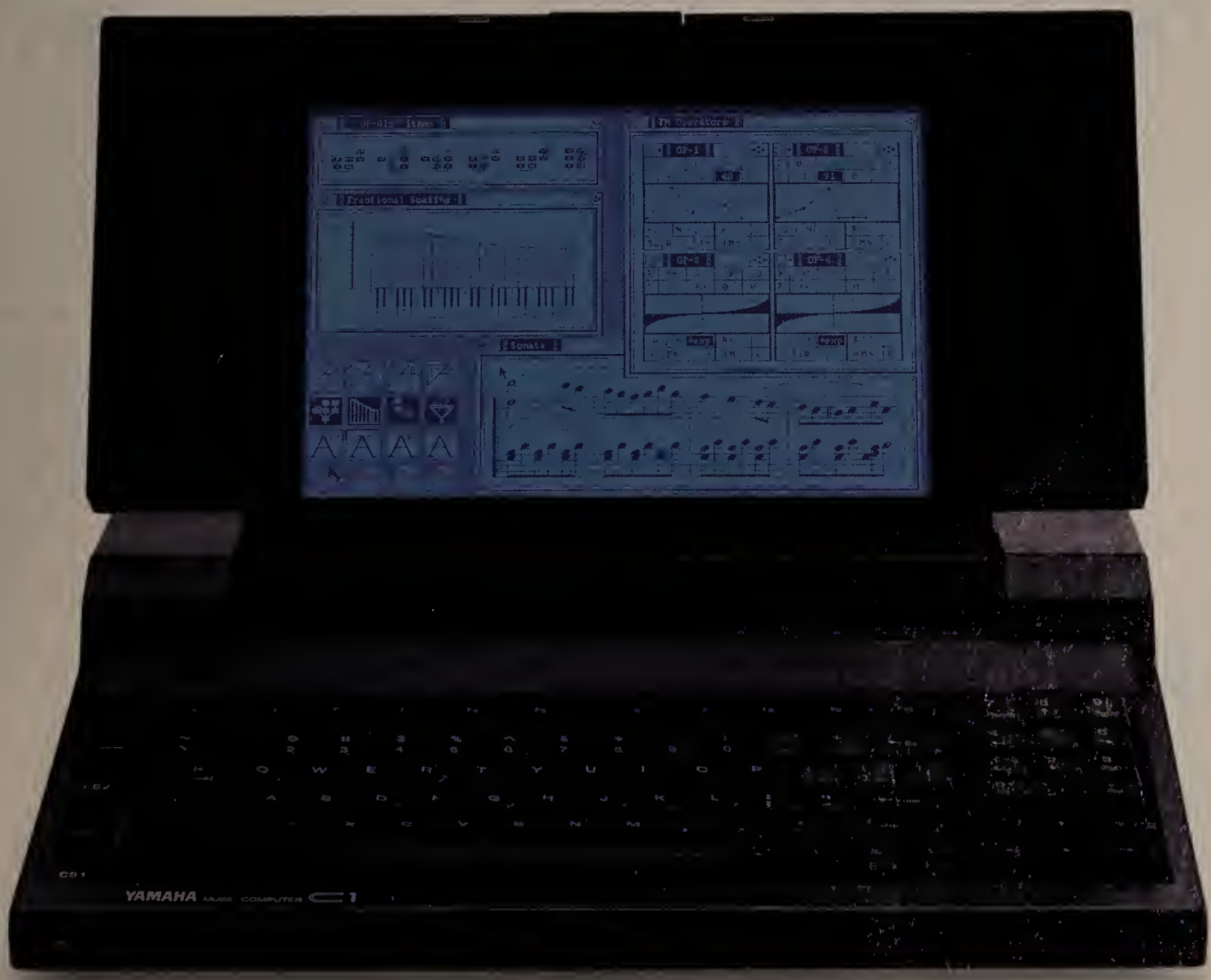

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Circle 273 on reader service card

Intelligence Quotient

Reviewers George Campbell (left) and Daniel Miles Kehoe

ROBERT CARDIN

George Campbell, author of this month's roundup of communications software, wrote his first computer program in 1963. "It was in FORTRAN," he recalls, "for an IBM 1620 mainframe. I disliked it so much that I didn't touch another computer until 1984." Obviously, Campbell found the PC more to his liking. Since then, he's become a communications expert and a successful author and programmer.

Daniel Miles Kehoe, whose byline appears on our review of seven PostScript printers, has dismantled hundreds—perhaps thousands—of laser printers in his career as a consultant, author, and developer of a PostScript compatibility benchmark suite.

It would be fair to call either of these reviewers a power user, an industry analyst, even a PC guru. But you won't find these reviews cluttered with industry gossip. Instead, the focus is on the make-or-break information you need to make intelligent buying decisions.

As a reviewer, Kehoe says, "my job is to seek a broad sampling of users' observations about quality and performance and to compare them with my experience. This process has a way of highlighting specific problems." Kehoe's experience turned up a crucial bit of buying intelligence: The popular but finicky Ricoh engines require a technician's attention every few thousand pages to continue delivering acceptable print quality. That's the sort of information you won't find in a spec sheet or an advertisement.

You can't take a PC communications program apart with a screwdriver, but George Campbell was able to dig into the nine packages in our roundup. The shareware and ex-shareware products got highest marks, he reports. "Among the commercial packages, I had the sense that nobody on the development team had *used* them. With the shareware products, I felt that the people who designed them used them regularly. It confirmed my belief that some of the best software evolves when one person is in charge of the development process."

The most important part of a communications package? "The user interface," Campbell says. "The ideal interface offers a choice of ways to approach each command. The beginner has plenty of context-sensitive help; experienced users can take advantage of shortcuts. *ProComm Plus* fits that bill well."

In the fitful world of PC technology, intelligence is a precious commodity. Fortunately, our reviewers' collective experience adds up to a perspective that means something to the business buyer. And they've promised to keep up the good work—as long as we promise to stay away from FORTRAN. ●

Ed Bott

Ed Bott
Managing Editor

House.

Senate.

We found a measure they could both agree on.

Up on the hill it looked like another split along party lines. Both Macintosh and PC users fought for access to the same information. Until a TOPS network brought them together in bipartisan agreement, that is.

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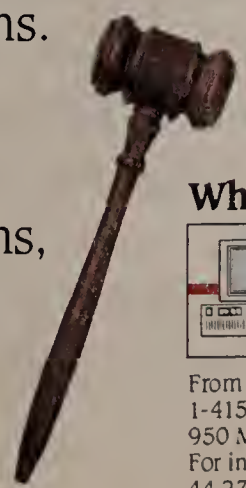

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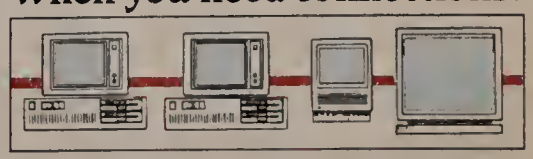

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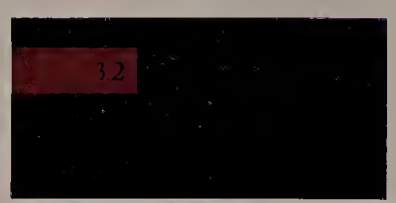

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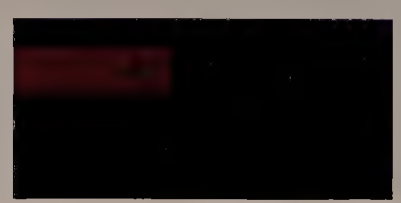

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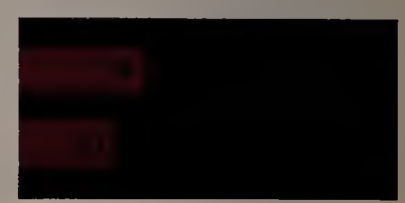

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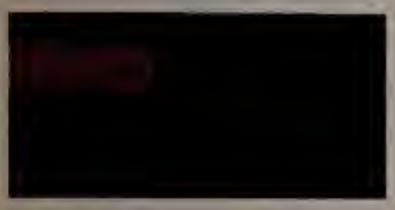

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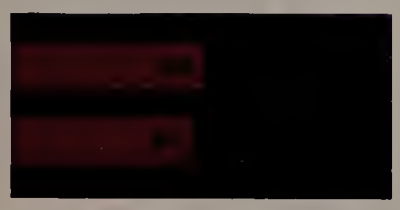

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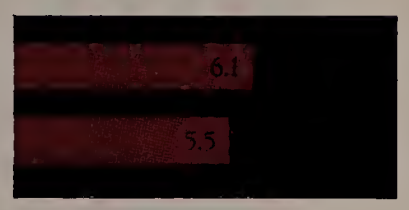

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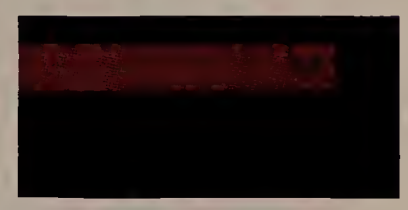

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IBM Bolsters OS/2

Hopes Office Suite, Operating System Upgrades Will Accelerate Application Development

In what it called the most sweeping set of software announcements in its history, IBM unveiled a suite of applications for OS/2 Extended Edition workstations, along with upgrades to OS/2. The *OfficeVision* family exploits OS/2's multitasking and its Presentation Manager interface and will run on OS/2 nets as well as mainframes and AS/400 minis. The network version, at $750 per workstation, will arrive in September. IBM is providing third-party developers with technical details on how to exploit *OfficeVision* services such as electronic mail with snap-on applications. OS/2 Standard Edition 1.2, scheduled to ship in September for $340, makes the Presentation Manager shell less clunky via more extensive use of icons and more direct manipulation of files. OS/2 1.2 lacks 80386-specific support but incorporates a High Performance File System that handles partitions and files up to 2GB and retrieves files 15 to 200 percent faster than the FAT (File Allocation Table) system. IBM is promising its long-overdue OS/2 device drivers, including those for PostScript printers, with the new release. Scheduled for November, the $830 OS/2 Extended Edition 1.2 will offer multiuser data base operations on an OS/2 net, an improved SNA gateway, and added net interfaces that boost compatibility with Microsoft's *OS/2 LAN Manager*. More than a dozen firms (mostly mainframe software vendors) have pledged allegiance to OS/2 and/or *OfficeVision*, but PC application development is proceeding at its usual slow pace.

Nantucket Leaving dBASE

Compiler Developer Charts Object-Oriented Course Away From dBASE Language

At its developers conference in June, Nantucket introduced the fifth version of its popular *Clipper* dBASE-language compiler, one that signals a new strategic direction for the company away from the dBASE language. The leading supplier of dBASE aftermarket products, Nantucket is "no longer strategically committed to the dBASE language," says President Larry Heimendinger. "We are evolving the company away from dBASE, although we will remain tied to it for the foreseeable future." He blames Ashton-Tate's latest twists in the language for his decision: "It's tough to look at the way *dBASE IV* manipulates dBASE and feel comfortable about the language." The principal enhancement to *Clipper 5.0*, scheduled to ship in September, is a virtual-memory-management scheme with a dynamic linker/loader that eliminates the need for overlay files in *Clipper* applications. But it's the object-oriented elements in the latest version—such as the ability to treat arrays as objects—that signal the new direction, says Heimendinger. Nantucket plans to release a fully object-oriented version before April 1990 that will run under DOS, *Windows*, and OS/2 (in character and graphic modes) and on the Macintosh. Users will be able to link to any *dBASE*-compatible or SQL data base. However, Nantucket will maintain the *Clipper* interface and backward compatibility with prior versions.

Lotus Offers Net Deals

Unified Network Scheme, Release 3.0 Introduction Aimed to Reassert Leadership

Lotus, which previously offered only full-priced network deals, has announced a common networking scheme with price breaks. *1-2-3*, *Symphony*, *Manuscript*, and other mainstream applications will come in three flavors: a standard edition (priced as usual), a server edition with net administration utilities (priced $100 higher), and a documentation-only workstation edition (priced $200 less than the standard edition). The server software notifies the net administrator if more users start running the package than have been licensed. Applications will be standardized for Novell, 3Com, Banyan, and IBM nets, says workstation vice president Frank Moss. Under Lotus's "file reservation" scheme, one user can write to a file while others read it, and users can swap the write privilege. *Symphony* and *Manuscript* network packages were scheduled for June shipment, while those for *1-2-3* versions will follow their stand-alone editions by 90 days. That means release 3.0's net offerings will arrive in September (at press time Lotus planned to release its new flagship by June 19). The company hopes that release 3.0, which will come with 24-hour toll-free support, will reinforce its near-monopoly in spreadsheets—estimated by InfoCorp to be 68 percent of total worldwide sales last year. Repeated update delays have created a window for competitors like Microsoft, whose *Excel* ended 1988 with a 4 percent market share. Lotus gave no further word on *1-2-3/G*, although this Presentation Manager edition began appearing in public in May.

Emerson Sells Clones

Consumer Electronics Giant Will Rely on Distribution Expertise

Another consumer electronics giant has thrown its hat into the broadening ring for home/office computers—and this one's an American company. The $761 million Emerson Radio Corporation hopes to leverage its size, manufacturing capabilities, and distribution expertise to sell what has become a commodity product in mass merchant channels. Emerson has formed a computer manufacturing concern, Emerson Technologies, and a marketing arm, Emerson Computer Corporation Division (ECCO), both based in Los Angeles. Emerson Technologies' president will be Christopher Daly, while Senior Vice President of Sales and Marketing Larry Metz will head ECCO. Together, the pair played crucial roles in leading Los Angeles start-up Packard-Bell to success in the home/office market. Emerson already distributes its consumer electronics products through the 24 largest retail outlets, which, Daly claims, account for approximately 80 percent of all consumer electronics sales. It also will apply what it has learned in surface-mount technology, very-large-system integration, and robotics to manufacture both relabeled and brand name products in the United States. Emerson's offerings, expected to ship this summer, include a 10-MHz XT for under $600, a 16-MHz AT for less than $1000, and another under-$1000 model based on Intel's 386SX chip. All will feature DOS 3.3 in ROM. The AT and SX computers will include a voice chip that cues users on installation procedures such as disk formatting.

Hayes Buys JT Fax

Modem Kingpin Finds Quick Way to Add Fax Capability to Its Line

In what analysts call an important strategic move, Hayes Microcomputer Products has purchased the JT Fax hardware and software lines of nearby Quadram Technologies and Asher Technologies, both subsidiaries of Intelligent Systems. Key among the line of PC fax boards and enabling software, acquired by Hayes for an undisclosed sum, is the JT Fax Pro96 (see *Top of the News, PCW,* May 1989). This device includes a 2400-bps modem and a 9600-bps group III fax board that employs an extended version of the Hayes AT modem command set for sending faxes from standard communications programs. Such multifunction boards represent the primary evolutionary path for modem companies like Hayes, maintains International Data Corporation analyst Josh Gonze, who calls Hayes's entry "a major turning point on the road toward eventual integration of fax and data modems." The $125 million firm already dominates a fractured dial-up-modem market with a 20 percent share, says Gonze. "Hayes was skeptical, but they seem to have decided that, yes, there is a market for fax capability tied to a data modem," adds CAP International analyst Judy Pirani. "This gives them sort of a jump start in that market." Hayes will keep the JT Fax staff, and Quadram will continue to provide manufacturing and support during the transition. But the JT Fax Pro96, originally scheduled for May shipment, will be delayed until the end of the year.

Borland Braces

Counters Microsoft Assault With Refocus on C and Pascal

Borland is marshaling its resources to counter an all-out assault by Microsoft on its language business in general and its preeminence in Pascal sales in particular. Borland has stepped up its support for students and teachers, who are largely responsible for *Turbo Pascal* supplanting Microsoft's *BASIC* line as the entry-level language of choice. Borland's new educational lab pack provides a 10-user license of *Turbo Pascal 5.5* for $300. Additionally, coupons let students buy any Borland language for about one-third the retail price. On another front, Borland has decided to suspend further upgrades of *Turbo Basic* and *Turbo Prolog* to shift resources to its Pascal and C products. However, Vice President of Product Management Rob Dickerson insists that bug fixes and support will continue. He describes the battle with Microsoft as a "two-front war": Both companies are vying for sales of C products to corporate developers, and Microsoft is trying to crack Borland's stranglehold on Pascal programming. Microsoft is offering retailers a three-for-the-price-of-two deal to lower prices enough to woo *Turbo Pascal* upgraders to its just-introduced *QuickPascal*. But Dickerson maintains that dealers will prefer *Turbo Pascal*'s higher prices and margins and will push Borland's product. The company is prepared to shift market development dollars to any area where Microsoft makes headway. Market researchers give Microsoft's generally higher-priced products about a 59 percent share of language dollars, while Borland maintains a similar percentage in unit share. ●

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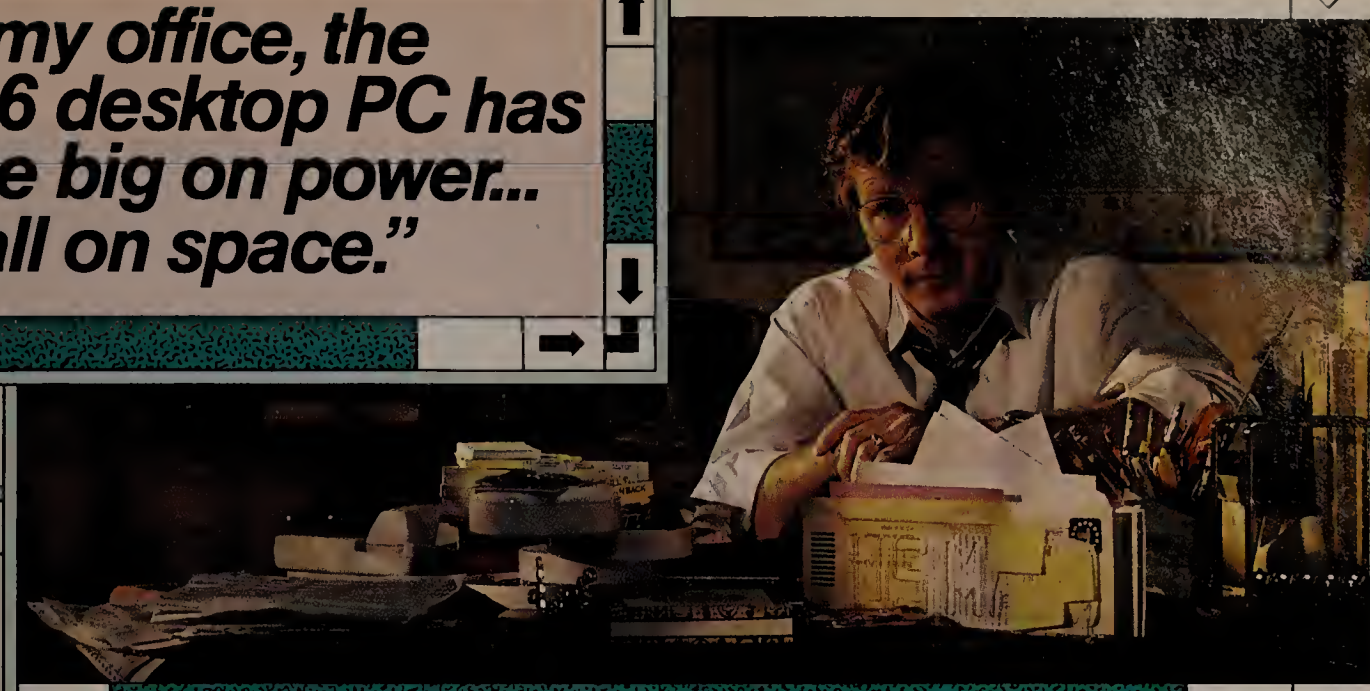

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GERARD KUNKEL

AGE: "31, last March."

PROFESSION: Artist & Designer. Director of Design & Electronic Publishing, *PC Magazine.*

CREDITS: Gerard's designs, both traditional and electronic, have graced publications from *Personal Computing* to *Business Week.*

LATEST PROJECT: Author of *Graphic Design in PostScript,*® published by Scott, Foresman & Co.

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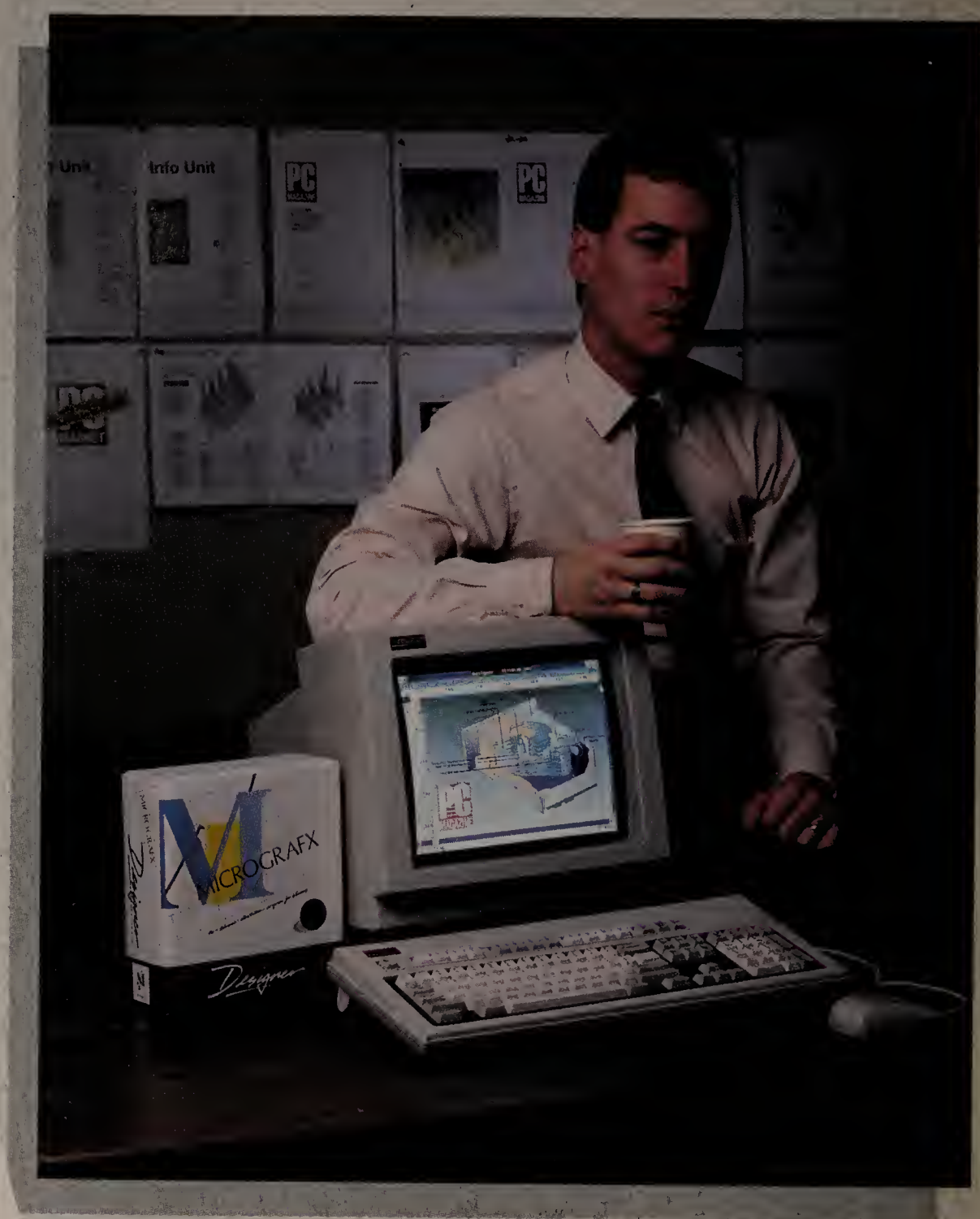

Gerard Kunkel, Director of Design & Electronic Publishing: Designer user.

Micrografx Designer, winner of the PC Magazine Technical Excellence Award, Graphic Software, 1988

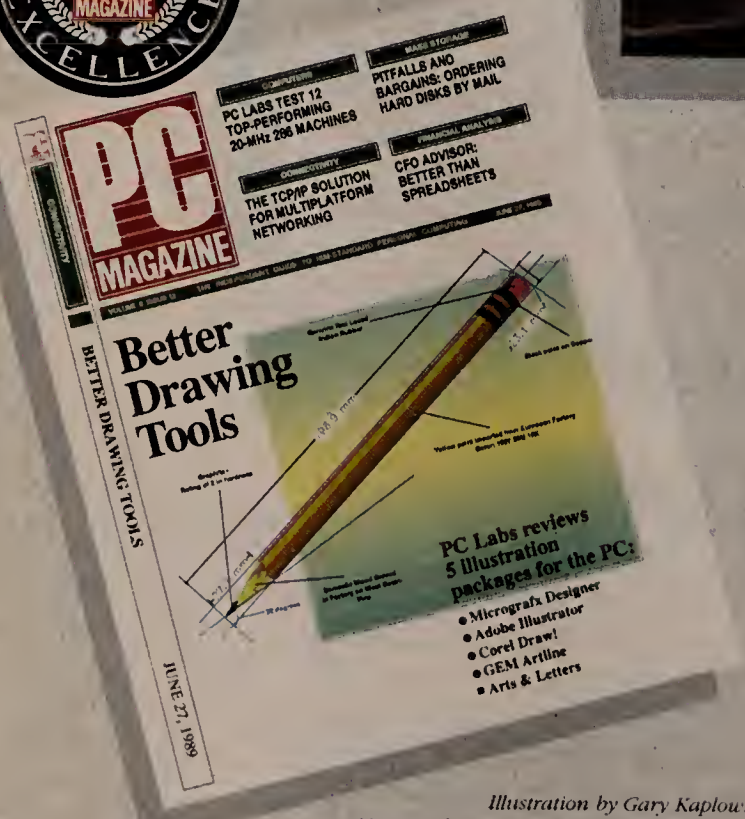

Illustration by Gary Kaplow. Micrografx Designer was used extensively in producing PC Magazine's new look. Many of the illustrations in this issue were done with Designer.

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DSG 8.1

Richard Landry

Does IBM Have the Office Vision?

IBM has seen the future, and it runs on mainframes.

With OfficeVision, Big Blue is staking its survival on the union of personal computers and its biggest iron.

They say old dogs don't learn new tricks, but these days IBM seems out to prove the adage wrong. A case in point is *OfficeVision*, Big Blue's new software environment for OS/2 (see *Top of the News* and *Industry Outlook* in this issue).

Even with commercial successes like *DisplayWrite*, IBM always managed to turn out lackluster PC software. *OfficeVision* changes that. Not only is it the first suite of Presentation Manager applications to arrive from a major vendor, it's also a good example of innovative software design. Further, *OfficeVision* is an open platform that several big-time developers like Lotus and Microsoft have already pledged to support. So although it's shocking to admit, Big Blue just might have a hit on its hands.

OfficeVision comes at the right time in the evolution of PC software. Developers are increasingly concerned about the lack of personality and intuitiveness in the so-called easy-to-use Presentation Manager. Unlike the Macintosh interface, Presentation Manager doesn't simplify computing with familiar metaphors that relate computer processes to everyday office activities. Instead, Presentation Manager is depressingly like DOS with menus. And unlike DOS, there are as yet no tools to let power users extensively customize it.

Compared with the Mac, *OfficeVision* is more like a statement of direction than a full-fledged PC environment. IBM added some nice bells and whistles to Presentation Manager—you can mail a document by dropping its icon into an electronic in-box, for example. But Big Blue spent most of its energy trying to give its faltering mainframes a new lease on life by making it easier to consolidate information scattered in disparate parts of a large organization.

Big Blue says that with a powerful interface like *OfficeVision*, users can concentrate on analyzing data while mainframes concentrate on providing it. The problem: No other PC vendor seems interested in eking more use out of the mainframe. Instead, they're trying to kill it with data base server technology that promises to make big, expensive iron obsolete (see "Well-Connected Data Bases" in this issue). That's bad news for IBM, which makes most of its money selling large systems. Thus, a PC software project with a decidedly mainframe bent.

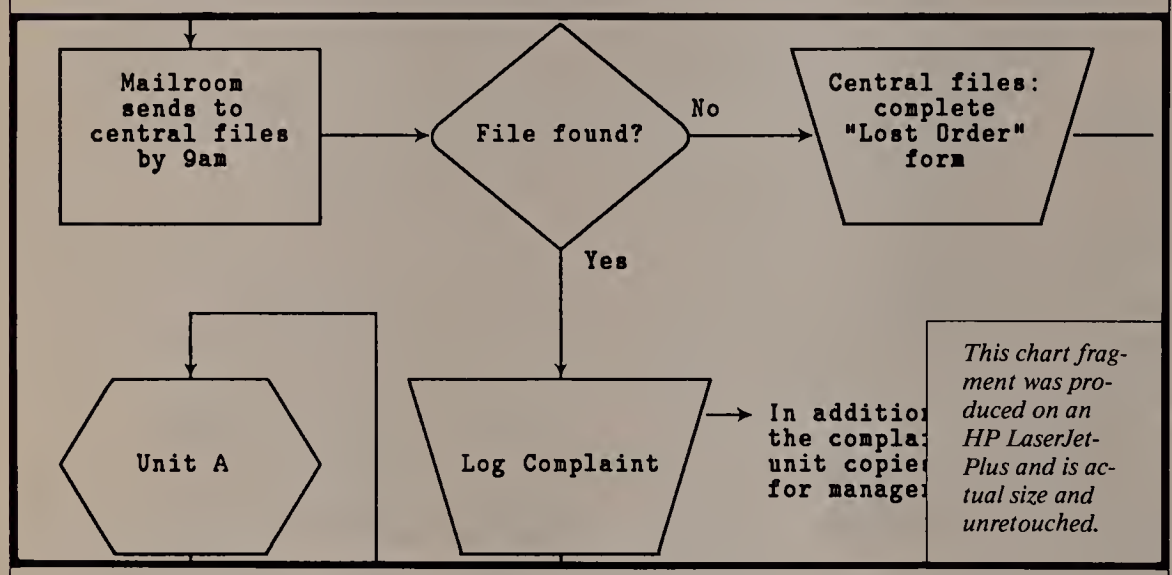
IBM clearly views *OfficeVision* as a laboratory to try out new interface concepts that will one day make their way into Presentation Manager itself. Unfortunately, its focus on mainframes may slow development at the PC end. For example, users won't be able to coordinate information from multiple applications into a single document unless vendors agree on a common method for sharing data. IBM's answer to the problem is an extension of its DCA file format called MODCA (Mixed-Object Document Content Architecture). But Lotus points out that MODCA lacks a

(continues)

FRED STIMSON

EasyFlow

An on-screen chart processor that knows about charts and diagrams, not just another "screen-draw" program that makes you do most of the work. **EasyFlow** is a powerful full-screen graphics program dedicated to data-flow diagrams, flow charts and organization charts. With it you can quickly compose diagrams. More important, you can easily modify them so they are always up to date.



This chart fragment was produced on an HP LaserJet-Plus and is actual size and unretouched.

Automatic. Fully automatic text centering within shapes. Fully automatic line routing & re-routing. Fully automatic placement of text along lines.

Fast. Written in assembly language for speed.

Large. Diagram size limited only by available memory. Supports LIM expanded memory. Diagram too large for your printer? EasyFlow automatically breaks the diagram up & prints it in page size pieces.

Standard. All standard data flow and flowcharting shapes included. Other shape libraries are available.

User friendly. Don't take our word for it. PC Magazine says *"EASYFLOW lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts"*.

Mouse. Optional but fully supported.

It works. Over 50,000 copies sold. Two of the "big eight" accounting firms have world wide site licenses for the use of EasyFlow.

It prints. On most popular printers including IBM, Epson, Toshiba, HP LaserJets, HP Desk Jet XEROX 4045, postscript printers and many others.

It plots. On HP7440, 7475, 7550 and 7585B plotters.

Documented: 130 page manual plus over 150 screens of context sensitive help.

Rush delivery: Order by noon today (eastern time) and you'll have it tomorrow. Rush delivery charge is $10.50 (instead of $2.00) and is available only to continental USA and Canada.

EasyFlow works on IBM PC's, IBM PS/2 and compatibles. Requires 512K memory, hard disk and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card.

Order direct for only **$149.95** + $2.00 S&H (USA/Canada), $10.00 (foreign). Payment by M.O., check, VISA MasterCard or Company PO.

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specification for spreadsheets. Land mines like this abound in the *OfficeVision* world.

Nobody should doubt that a lot of potential answers are cooking in Big Blue's R&D labs. For example, IBM bought the rights to the acclaimed Metaphor Data Interpretation System. This makes it possible for users to build applications that involve data base, spreadsheet, and word processor capabilities from scratch using point-and-shoot methods. IBM also has a piece of Steve Jobs's NextStep object-oriented programming environment. If Big Blue does its job right, these powerful technologies can help transform Presentation Manager into a clear winner.

Just as IBM unwittingly sped the demise of centralized computing with the PC, it's possible that *OfficeVision* will drag IBM, kicking and screaming, into the future—a future where mainframes become increasingly less important, even in the largest organizations. Just as with the PS/2, IBM now finds itself in the position of leading the PC industry through technical innovation. But it also runs the risk of letting narrow self-interest get in the way.

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107; fax 415/442-1891; MCI Mail Richard Landry/ 301-3685. ●

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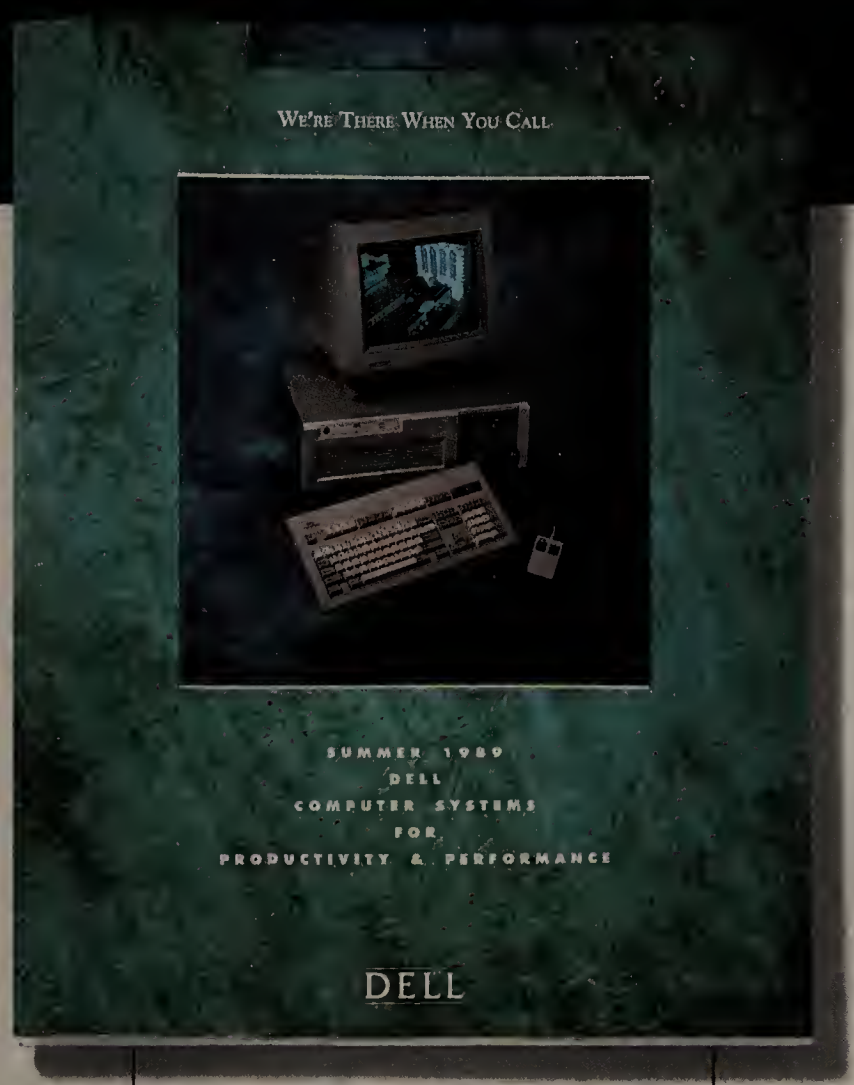

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11DH9

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If you want better word processing, don't settle for Perfect.

The trouble with WordPerfect® is, sometimes it isn't. Not when you compare it to our new Microsoft® Word version 5.0. Not when you consider that with Word 5.0, you'll pump out your day-to-day jobs quicker, easier, even smarter than you ever thought possible. On your IBM® PC or 100% compatible. It doesn't get much simpler than this.

Introducing new Microsoft Word 5.0. When Perfect just isn't good enough.

Example: With Word 5.0 you can choose commands by either using simple speed keys or just selecting from a menu.

You can tab, delete, italicize, move, change font and size, even cut and paste with about 50% fewer keystrokes than you-know-who.

Your workgroup can even make any annotations right on a document, then you can merge and collect all the comments. WordPerfect? No comment.

You can also sort, list, search and archive files across multiple directories, on your PC or across a network, thanks to the Word 5.0 document management and retrieval system.

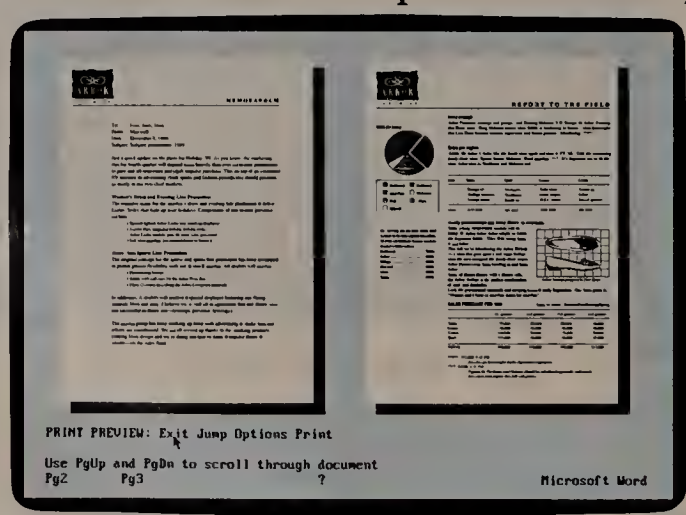
Or incorporate part, or all of a Lotus® 1-2-3,® Microsoft Excel or Microsoft Works spreadsheet into a Word document. And then update it. In seconds.

All of which is reason enough to try new Word 5.0. But for those who need a little more

COMMON WORDPROCESSING TASKS

Which requires fewer keystrokes?	Microsoft Word 5.0	Word-Perfect 5.0
Copy Block	4	7
Delete Line	2	4
Italicize Word	2	5
Change Font and Size	6	9
Add Footer	1	7
Box Paragraph	5	12
Total	20	44

With new Word 5.0 you'll do about 50% less hunting and pecking than with WordPerfect.



Word 5.0 Print Preview makes sure what you see is what you want. Before you print it.

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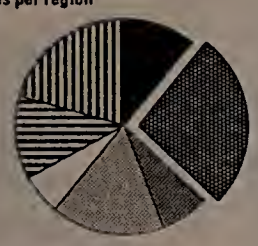
REPORT TO THE FIELD

Sales per region



Northwest	Southwest
Northeast	Southeast
East	West
Midwest	

The following are the most recent Telex numbers for the Arbor regional sales offices. All client and distributor inquiries should be directed to these numbers.

Los Angeles	06785
Atlanta	05786
Chicago	07658
New York	08657
Miami	05876
Detroit	05875

Shoe enough

Arbor Footwear comings and goings: Jim Deaning becomes V.P. Design for Arbor Evening and Dress wear. Greg Vroonas moves from Peoria to marketing in Miami. Joan MacArthur and Lisa Doan become account supervisor and media planner, respectively.[1 Ridgley C.]

Sales per region

Across the board it looks like the South once again led sales in FY '88. With the continuing pump craze those figures should maintain, if not improve.[2 Jim W.] It's important not to let the other areas such as Northeast and Midwest fall.

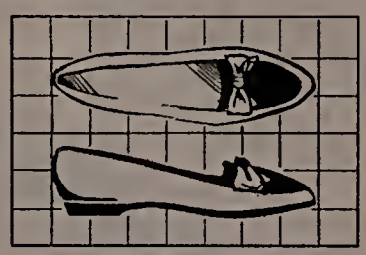
Style:	Dress	Sport	Career	Casual
	Evening eel	Weekender	Tailor made	Trouser tip
	Midnight moccasin	Kickaround	Ladies wingtip	Loafer
	Twilight toeless	Runner up	M.B.A.-bound	Special spectator
Price:	$150-$350	$85-$125	$120-$250	$90-$150

Young professionals use Arbor Walker to commute.

Soon, young professional women will no longer be using Arbor shoes simply to climb the corporate ladder. They'll be using them to get there.

This fall we're introducing the Arbor Walker — a shoe that goes quite a few steps further than the now-accepted but unattractive tennis shoes women have been wearing to and from work.

Made of Italian leather with a rubber sole, the Arbor Walker is the perfect combination of style and durability.



Arbor Walker designed by Pier Besto.

Look for promotional materials and carrying cases in early September. Our sales point is: "Women don't have to sacrifice looks for comfort."

SALES FORECAST FOR 1989 Types of shoes: Summer/Fall/Holiday/Spring

	1st quarter	*2nd quarter*	*3rd quarter*	*4th quarter*
Dress	95,000	87,000	120,000	60,000
Career	40,000	82,000	60,000	90,000
Casual	120,000	85,000	75,000	80,000
Sport	135,000	60,000	90,000	87,000
TOTAL:	390,000	314,000	345,000	317,000

[1 Ridgley C.] *9/27/88, 4:32 PM*
let's discuss forecast for media department expansion.
[2 Jim W.] *7/1/88, 1:15 PM*
Figures for Northeast and Midwest should be calculated separately mid-month
let's catch them before they fall with promo.

Text, graphics, fonts, annotations. Faster, simpler, cleaner. Compliments of new Microsoft Word 5.0.

convincing, picture this: Outline View. When creating longer documents, Outline View lets you switch to a view of headings only. Which means you can see the structure of your entire document, and rearrange it just by rearranging your headings.

★★★★	8.4	Microsoft Word
★★★★	8.1	WordPerfect

Software Digest recently chose the best overall advanced word processor on the market. Who won? In a word, Word.

We could go on and on with more advantages. But your best bet is to call for a convincing demo at: (800) 541-1261, Dept. J13. After you call us, try calling WordPerfect for a demo. Run both, our Word against theirs, head to head, and then ask yourself:

Which one brings your word processing closer to perfection?

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and 1-2-3 are registered trademarks of Lotus Development Corporation. WordPerfect is a registered trademark of WordPerfect Corporation. Customers in Canada, call (416) 673-7638. Outside North America, call (206) 882-8661. Software Digest rating from April 1989 issue. This offer valid only in the 50 United States.

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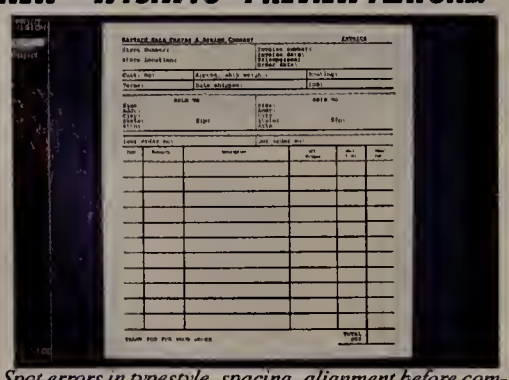

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Next in

PC WORLD

September

Special Report: Programming

Object-oriented languages are changing the face of PC programming. *HyperCard* made it possible for any Macintosh user to customize his or her environment. Now, an assortment of equally revolutionary products—including *HyperPAD* and *Turbo Pascal*—are letting ordinary PC users do the work of professional programmers without scaling a steep learning curve.

High-Mileage E-Mail

A LAN without E-mail is like a Ferrari without wheels—it's a marvel of expensive engineering, but it won't take you where you need to go. *PC World* looks at five high-performance E-mail packages that promise to shift your interoffice communications into high gear.

Word Versus WordPerfect, Round 5.0

With its feature-packed *Word 5.0*, Microsoft has picked up the *WordPerfect 5.0* gauntlet. *PC World* asks: Is *Word* the new heavyweight champion among word processors?

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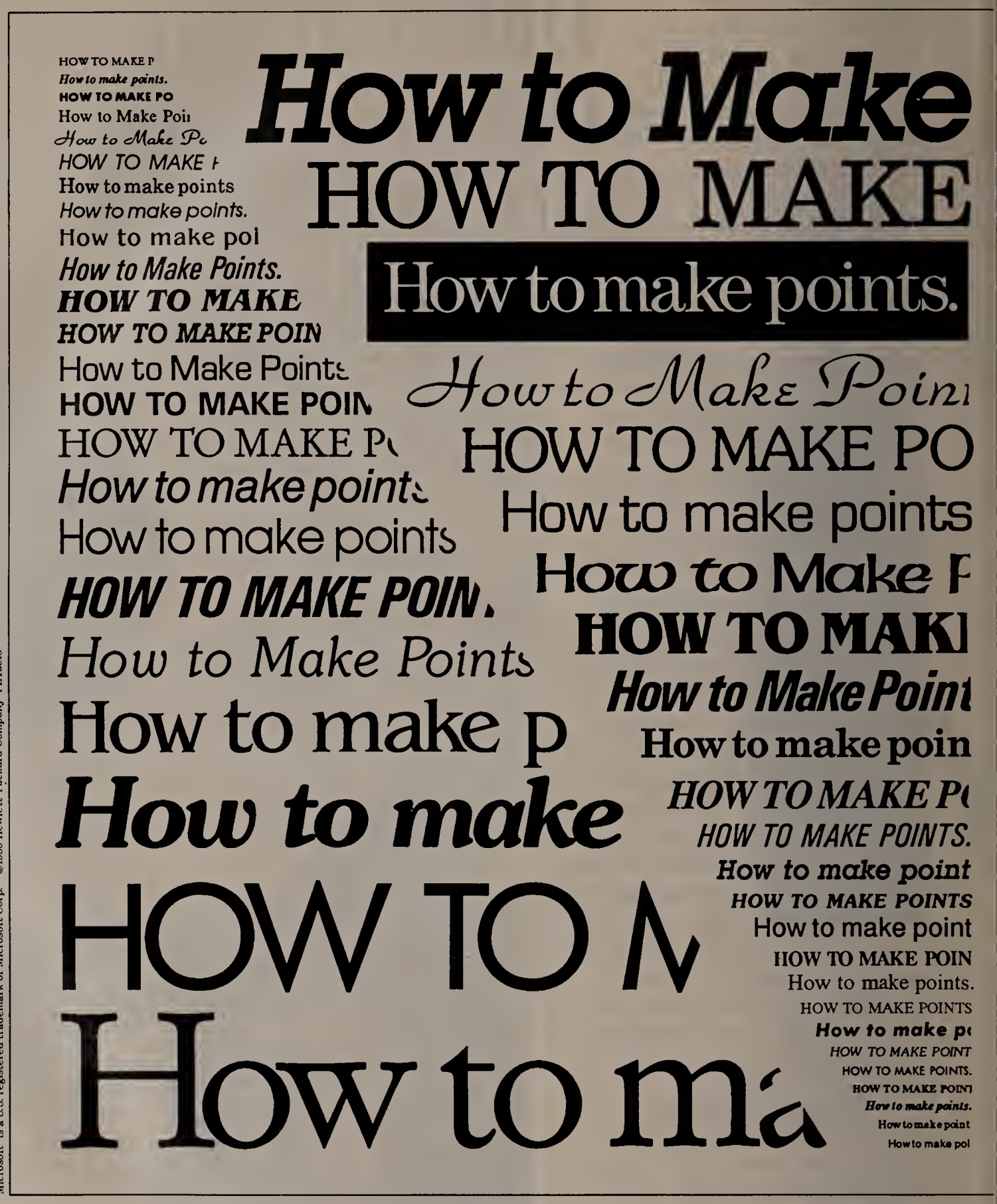

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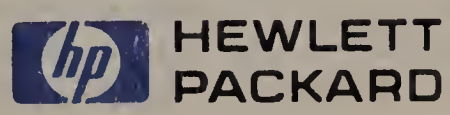

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IT EATS IBM'S LUNCH... AND SERVES DELL FOR DINNER!

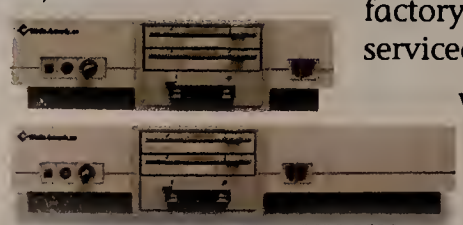
Introducing Wells American's CompuStar II. It's one *hungry* machine. Feed it the toughest applications you can dish out and it's ready for "seconds" before IBM, Dell and all the others even get started.

IT FEEDS ON THE COMPETITION.

CompuStar II's enormous appetite for devouring the competition comes from its unique, modular design. Interchangeable, plug-in CPU "modules" are available in 80286, 80386SX and 80386 configurations. The modules are remarkably inexpensive — as little as $750 for a '286 module, and incredibly powerful.* The 33MHz '386 module achieves a stunning MIPS rating! Best of all, for up to one full year after purchase, you can trade in the module you originally select toward the purchase of any of the other more powerful modules.

IT DEVOURS OTHER COMPACTS.

Unlike other small footprint micros, CompuStar II won't put your computer expansion needs on a diet. Each system features an amazing *six* bus slots — four of them available in a fully configured VGA system. That's 25% more than IBM or Dell gives you. Better yet, you can have up to 11 slots with CompuStar II's exclusive bus expansion chassis. No other compact system available offers this much room for growth. And no other comparably sized system can accommodate that growth better than CompuStar II.



BUS EXPANSION CHASSIS

Its whopping 200 watt power supply gives you more than *twice* as much reserve power as IBM or Dell.

And CompuStar II has more room for disk/tape drives — *four* compartments in all; three accessible from the front panel. IBM and Dell give you just three compartments and only two are accessible from the front. CompuStar II also accommodates $5^1/_4$" *and* $3^1/_2$" disk drives. IBM and Dell restrict you to $3^1/_2$" drives only.

IT'S ALSO WELL-MANNERED.

Worried about quality and reliability? Don't! Wells American has been making PCs longer than IBM *or* Dell! Each CompuStar II is money back guaranteed for 31 days, factory warranted for a full year and can be field serviced from hundreds of locations worldwide.

When you think about it, buying an IBM or Dell system instead of our new CompuStar II is sort of like eating hamburger when you could have had steak — and paid less for it. CompuStar II. . .from Wells American. It makes "mincemeat" of everything else.

To receive a CompuStar II product information kit, **call 1-803-796-7800.** VAR inquiries also welcome.

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*CompuStar II'S CPU performance is so incredible you won't believe it! Call or write for complete benchmark information. Certified FCC Class A. For business use only.

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LETTERS

Reactions and responses from the PC World community

Just Say "First Amendment"

Few things bother me more than self-appointed guardians who make it their business to decide what I can or cannot read or buy. Censorship, no matter how well intentioned, is still censorship. Mr. Stevenson's and Mr. Pugh's letters ("Just Say No," *Letters, PCW,* April 1989) display an offensively paternalistic attitude that has no place in your magazine. Computers offer access to information and entertainment; as a consumer, I have a right to learn about the whole spectrum of software on the market. Don't let *PC World* be changed by the self-appointed and self-important!

Ted Koppel
Aurora, Colorado

Survival of the Fattest?

I'm getting tired of the unrelenting cheers for *WordPerfect 5.0* and other bloated word processors. Where are the improvements that will help me put words on the page, rather than just enhance their appearance? I could use an outliner with collapsible headings or real-time spell checking in place of the ability to wrap text around pictures. At the least, these fatties should be modular so that you only have to load the features you want. I'm willing to invest in more memory, but not for the power to do things I don't need to do.

Michael Neumann
Toronto, Ontario, Canada

What's This Pedal For?

I have a few thoughts on Pat Adams's article ["dBASE Users: Don't Take It!" *Another Angle, PCW,* April 1989].

Ashton-Tate's lawsuit is trying to stop evolution. CP/M preceded DOS, and *VisiCalc* preceded *1-2-3*, and in each case, the outward appearance was retained. Products that succeed generally follow a standard that users expect and already know how to deal with. Would you consider buying a car that put the gas pedal under the left foot, just so Ford's look and feel could remain unmolested?

In a competition, it's usually the loser who complains about the fairness of the match. Ashton-Tate's lawsuit is evidence that even it believes Fox has a better product.

David W. Foster
Stayton, Oregon

The Multitasking Challenge

I disagree with Lincoln Spector on the merits of *Desqview/386* versus *Windows/386* [*The Software Shelf, PCW,* April 1989]. After using various versions of *Desqview* for about a year—and suffering more than a few crashes along the way—I switched to *Windows/386*. The latter provides easier switching, resizing, and moving of windows, and applications that run under it are less likely to interfere with each other. Spector says that if *Desqview* users are willing to tinker, they will get a powerful multitasking environment. If users run well-behaved programs they may be OK, but no amount of tinkering will free them from the fear of being zapped into limbo if they really demand all that multitasking should deliver.

Jack Foss
San Francisco, California

The Print Looks Great, But...

Like your reviewer Wes Nihei [*The Hardware Shelf, PCW,* April 1989], I love the NEC

(continues)

ANTHONY RUSSO

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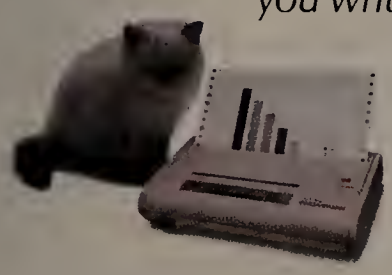

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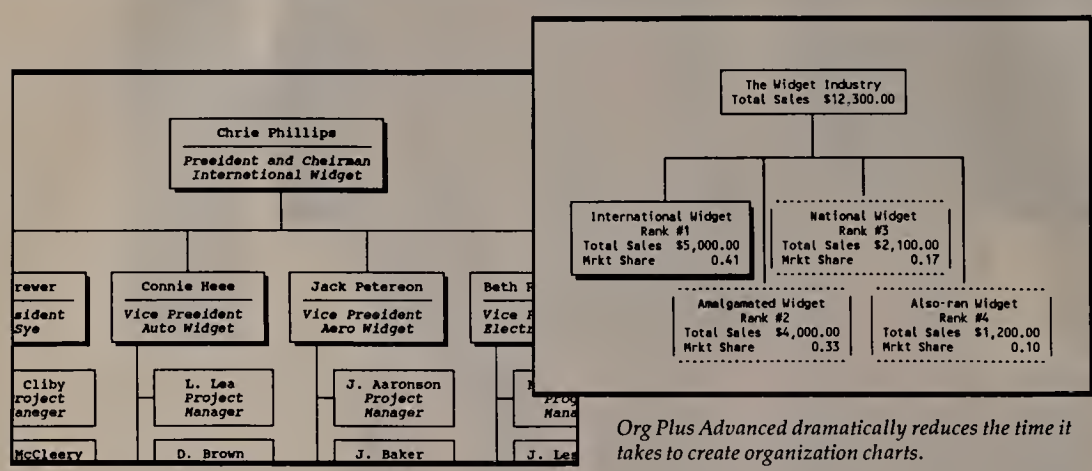
Circle 76 on reader service card

P5300 printer's superb print quality. However, I quickly found out, contrary to the statement in your review, that it does not print on envelopes or multipart forms. NEC technical support informed me that my finding was correct—the P5300 is not intended to print on this stationery. So now I have a machine that produces the best-looking output I have ever seen from a dot matrix printer, but it's useless in a one-printer office. Has your reviewer discovered something I don't know?

Richard D. Shipley
Salem, Oregon

The review unit we received printed addresses on legal-size envelopes without a hitch. NEC spokesperson David Rocheleau reports that many P5300 users can do the same, but NEC can't guarantee consistent performance with every type of envelope. The manufacturer suggests printing addresses on labels. Factors to keep in mind if you want to print envelopes are the thickness of the envelope, the weight of the paper, and the head gap position. —Wes Nihei



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Circle 7 on reader service card

They Could Pass for Brothers?

After reading your article "Can Anything Beat the Series II?" [*PCW*, February 1989], I was convinced that the Brother HL-8 was the best alternative to the HP LaserJet Series II. After I purchased the unit, I discovered that it only emulated the LaserJet Plus. Brother's customer service department told me that no upgrade exists. Needless to say, I am confused. Please shine some laser light on the subject.

Thomas L. Petro
Tomkins Cove, New York

According to Hewlett-Packard, the differences between the LaserJet Plus and LaserJet Series II PCL codes are minor. The Series II does away with certain of the Plus's limitations, namely the maximum 30-point type size, 16 fonts per page, and 32 fonts downloaded into memory. Obviously HP can't vouch for emulations of its products, but we were impressed during our tests by the HL-8's overall performance and its HP emulation. —Ed.

(continues)

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Frankly, the Norton Disk Doctor and the Norton Troubleshooter are worth the price of the new Advanced Edition all by themselves.

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If you *want* to lose it, however, you'll be glad to know that *WipeFile*™ and *WipeDisk*™ support DoD 5220.22-M 116c(6b), the Pentagon's latest data security specification.

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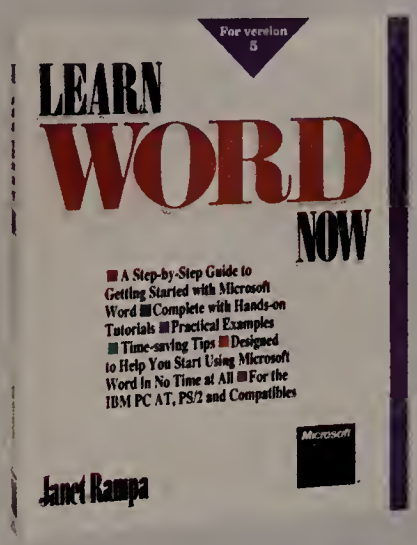

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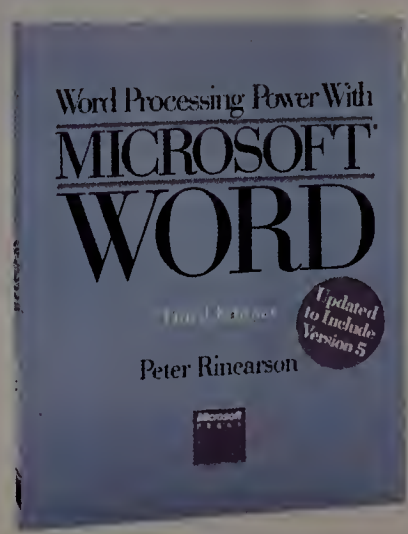

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Circle 209 on reader service card

Talk Back About Crosstalk

With all due respect to Ron White and *Crosstalk* ["Track CompuServe Charges With Crosstalk Mk.4," "Tips & Techniques," *PCW*, March 1989], have you ever heard of *TAPCIS?* This shareware program automates the process of logging on to CompuServe, sending and receiving E-mail, and participating in its many forums. It also calculates on-line charges, including charges for networks such as Telenet and Tymnet, and estimates your monthly bill in advance. It costs $79 and is available from the Support Group, whose number is 800/872-4768. Type "GO WPSG" on CompuServe for more information.

Greg Lief
Salem, Oregon

Thanks for "Thanks..."

Karl Koessel, thank you for your explanation of expanded and extended memory ["Thanks for the Memory," *The Help Screen*, *PCW*, April 1989]. It's the first lucid treatment of the subject I've ever seen. I've already referred a few colleagues to the article, and their reaction is always, "Now I get it!"

Jerry Lewis
Mountain View, CA

Corrections and Clarifications

In "Ventura Turns Two" (*PCW*, February 1989) we left out the buying information for *VP Toolbox*. It is sold by SNA, P.O. Box 3662, Princeton, NJ 08543; 609/799-9605.

(continues)

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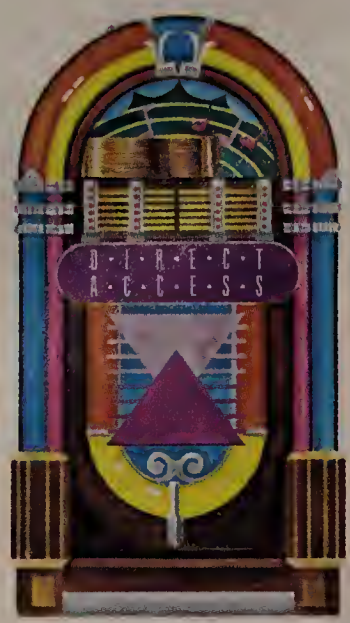

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The $30 upgrade from *dBASE III Plus* to *dBASE IV 1.0* ("Is dBASE IV Worth the Wait?" *PCW*, March 1989) applies only to copies purchased between February 17, 1988, and October 31, 1988. Upgrades to other copies of the program are $175.

The number for ordering Bitstream's *Fontware* installation program for *WordPerfect* ("From Worksheets to WordPerfect," "Tips & Techniques," *PCW*, April 1989) should have read 800/222-9409.

Our Buyers' Guide to transportable accessories ("Accessories for the Road," *PCW*, April 1989) contained a number of errors. Axonix Desk Pack Series does not support the Zenith TurbosPort as stated. Connect Computer Company's WonUnder weighs less than 2 pounds, doesn't include an AC adapter, and accommodates two-thirds–length 8-bit cards. *PC World* regrets the errors.

To send correspondence, please see How to Contact PC World, page 4. ●

POWER TIP NO. 59

WordPerfect 5.0 Batch Printing

To print a batch of 5.0 files from a single directory, first press <F5><Enter> to list the contents. Use the cursor keys to highlight each file you want to print and mark it by pressing <Shift>. Press 4, and *WordPerfect* prints all the marked files.

Bruno Terkaly
Corte Madera, California

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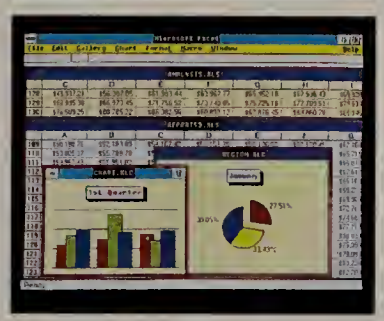

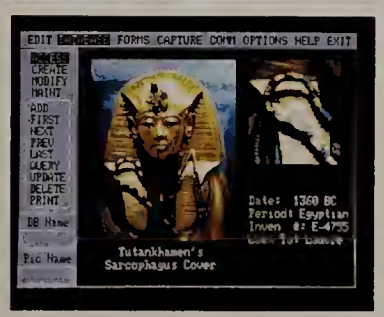

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THE HELP SCREEN

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Redirect printer output to an editable disk file, take a short look at EGA graphics on multifrequency monitors, sort out XT upgrade options, and survey expanded memory options for the IBM Model 30 286.

Karl Koessel

"Print" to Disk

Q. *How can I redirect printer output to a disk file? I have a few programs that don't have a "print to file" option and some others whose printer drivers make very poor use of my printer's abilities. If I could capture printer output in an ASCII file, I could use my word processor's advanced formatting capabilities to spruce up my reports.*

John Campbell
Long Beach, California

A. A retail program like *Print-Rite* (described in *Product Outlook*, *PCW*, July 1989) gives you the ability to print to disk, along with a host of other printer control features. But you can find a print-to-disk utility—and other simple, single-task programs—offered as shareware or in the public domain. Check out electronic bulletin boards, user group libraries, and shareware catalogs such as PC-SIG's (800/245-6717, 800/222-2996 in California). For example, LPT-DSK.ARC by George Bouche is available on CompuServe. Subscribers can log on, type GO IBMNET, select option 5 for the IBM Software Systems/Utilities Forum, select 3 for Libraries, select 3 again for General Utils, and download the file.

Flattened Outlook

Q. *I recently purchased a 386 equipped with a VGA video adapter and a Sony CPD-1302A monitor. I was told that the Sony was a multiscan monitor. However, when I run a program that generates EGA graphics, the display appears vertically compressed, as if only the middle 350 lines of the screen's 480 were being used. On the NEC MultiSync II that I use at work, the same programs fill the entire screen. The Sony handles switching between all other modes—whether text or graphics—without a problem, but the squashed EGA graphics display is disconcerting. Is there something wrong with my monitor?*

Dave Thewlis
Via CompuServe

A. The Sony CPD-1302A Multiscan is basically the original CPD-1302 slightly modified to accommodate VGA. Both monitors sense frequency changes when an adapter changes modes and automatically adjust the size of the screen appropriately.

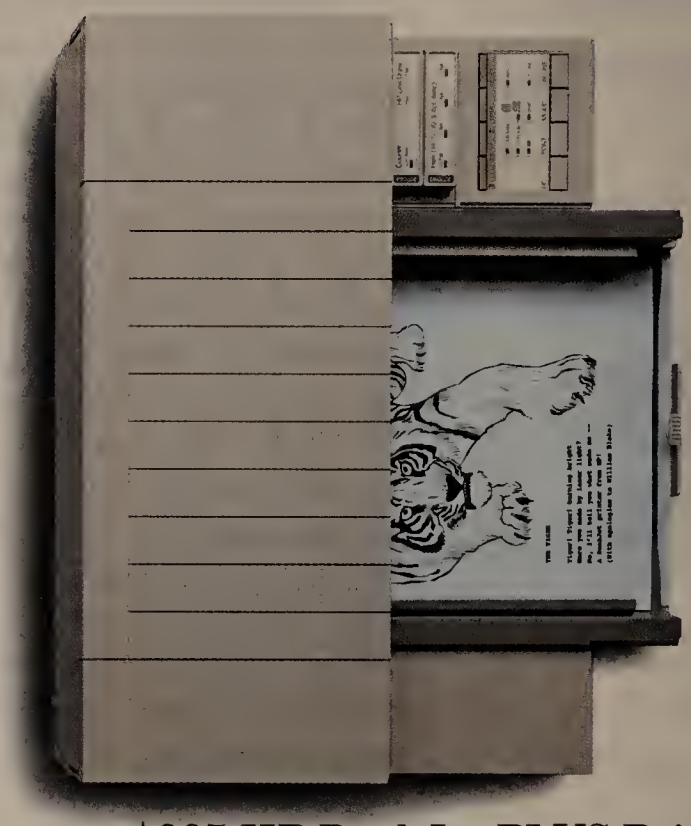
However, because the video signal's polarity—not its frequency—changes when a VGA switches to EGA graphics mode, the 1302A is unaware that the screen mode has changed; NEC's original MultiSync has the same limitations. There is no fix for the problem because the monitor's pre-VGA design does not include the circuitry necessary to test polarity. (NEC's MultiSync II was introduced after the advent of the VGA and was designed to handle EGA and VGA graphics with equal aplomb.)

Last June, Sony introduced the MultiscanHG model CPD-1304, which displays both EGA and VGA graphics on the full screen. Coupled with the appropriate video adapter, this monitor is capable of displaying even 1024 by 768 noninterlaced video.

(continues)

ANTHONY RUSSO

We keep telling people this is not a laser printer.



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HEWLETT PACKARD

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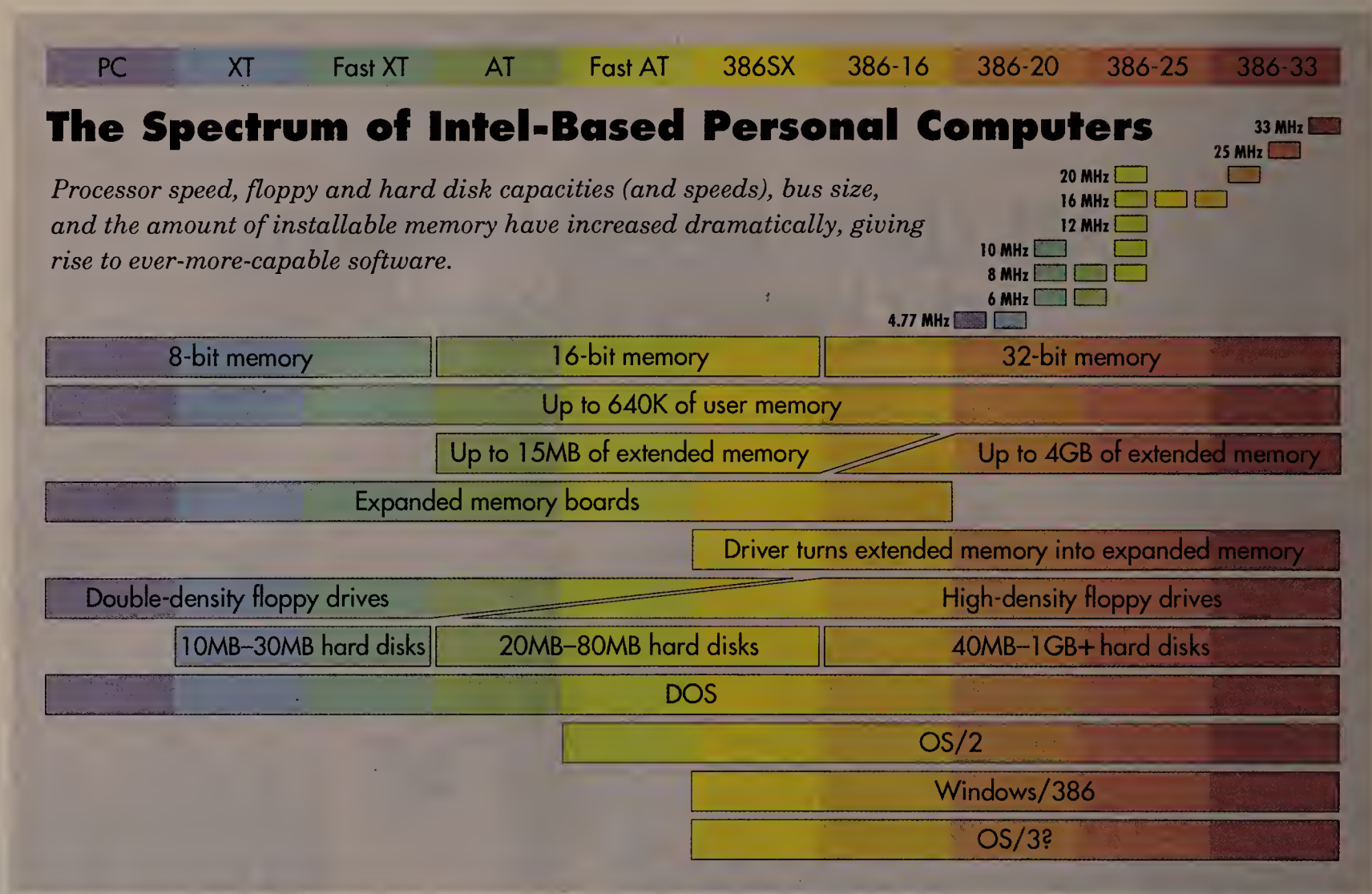

Which Way Is Up?

Q. *I don't know whether to upgrade my XT compatible by installing an accelerator card, replacing the motherboard, or buying a new system. I've already added 1MB of expanded memory on an AST multifunction board to the motherboard's 256K, and I have a 101-key keyboard. I think I need to move up to a 286; I'm not sure whether I need a 386.*

I do know I want more memory for programs like Desqview. *Also, I need at least 40MB of hard disk storage. Does it make sense to add a hard disk card so I can still use my Seagate ST10-controlled 20MB drive? What about data compression, via hardware or software, to wring more from my hard disk?*

Jack Allen
Pacific Palisades, California

A. How you choose to upgrade your system depends on your current hardware and the final configuration you'll need to run the programs you want to use. Most upgrade products take you only part of the distance; upgrading further entails replacing them. Some upgrades will affect your current equipment; upgrading one component may require upgrading another. For example, loading up with memory, a modem, an accelerator card, and more drives may necessitate a larger power supply.

Personal computers based on Intel processors, from the original IBM PC to the newest 33-MHz 386s, span a wide range of speed and capability (see **ABOVE**). In general, upgrading a system stops making sense after a certain point. You can keep upgrading, but you'll end up replacing almost every component—and paying for it piece by piece is more expensive than buying a whole new system.

Installing an accelerator card that sports a faster processor, adding a hard disk card, and using data compression software will give you a modest boost in performance and plenty of extra storage for a relatively low cost. You'll get an even bigger boost in processing speed with a motherboard replacement. If you could upgrade with a 386-based accelerator card or motherboard, you could add memory for Quarterdeck's *Desqview* less expensively

(continues)

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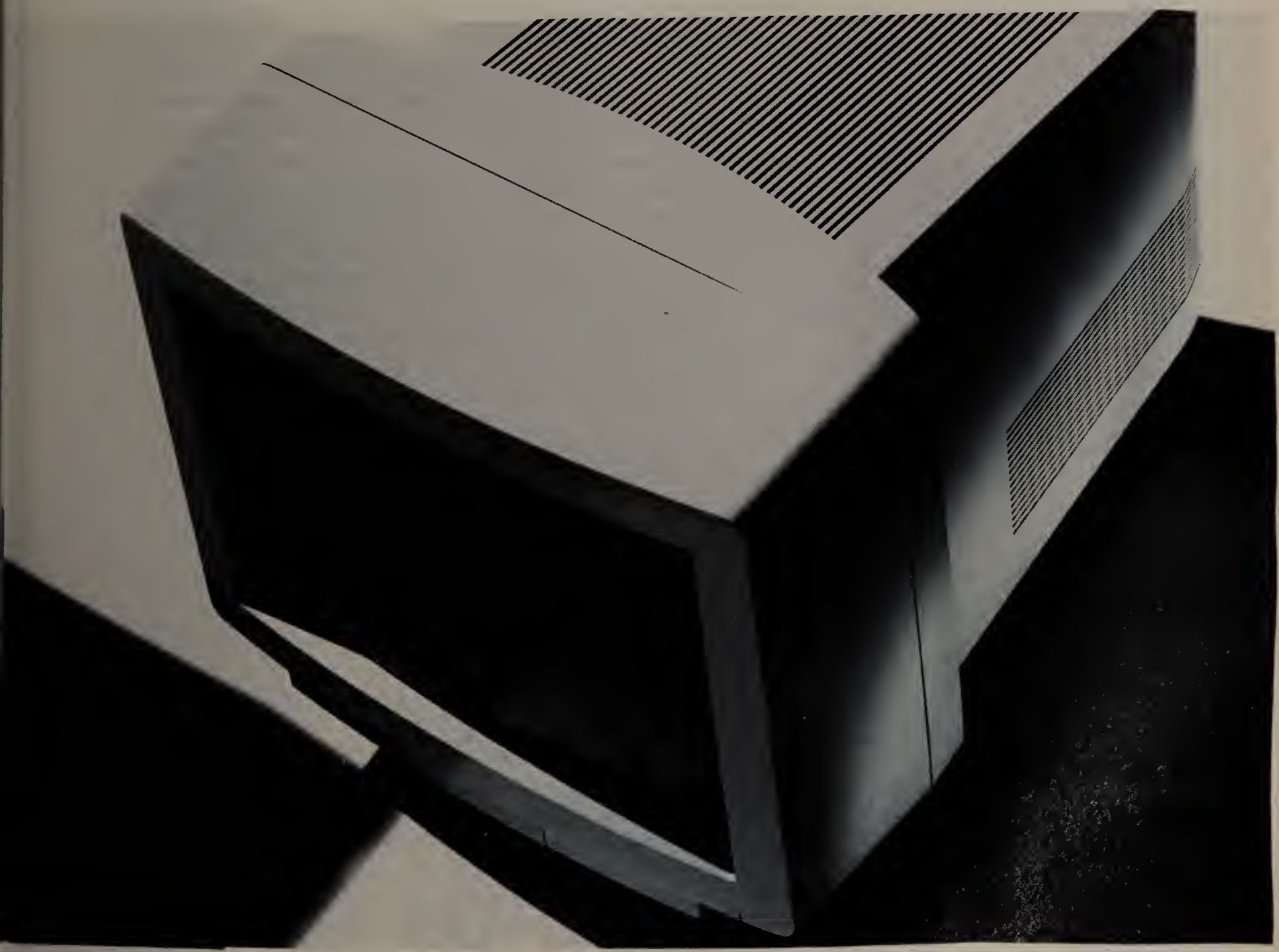

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than with expanded memory boards required for 286-based products.

Neither method will accelerate access to your current hard disk, however. If you opt for the motherboard, the board's AT bus will let you install a new hard disk controller for a faster hard disk. Just be sure that the controller card fits inside your XT; many 16-bit AT boards don't, because the XT's case is not as tall as the AT's.

A 20MB hard drive on a card will double your current storage capability, but 40MB hard disk cards are far more cost-effective. Consider also that your ST10 hard disk controller accommodates larger, faster hard drives. Then again, the XT has only two drive bays; unless you use a hard disk card, you'll have to replace the 20MB drive to get more storage in your XT. Note that swapping out the 20MB drive for a larger-capacity half-height unit would leave room for another half-height device, say a tape backup unit or another floppy drive.

If upgrading the processor is part of a plan to eventually run 16-bit software, such as OS/2, you'll need a high-density (1.2MB 5¼-inch or 1.44MB 3½-inch) floppy drive, which means a new floppy disk controller and a new floppy drive. In that case, I'd advise you to obtain the high-density floppy drive as part of a complete, new system.

Model 30 286 Expanded Memory

Q. *I own an IBM PS/2 Model 30 286, and I'm having trouble deciding how best to add memory to my system. IBM sells a Multifunction Adapter that holds up to 12MB, but it requires that the 30 286's motherboard, which accommodates 4MB, have no more than 512K installed. Furthermore, it adds extended memory, and I want EMS 4.0 expanded memory. I'm a student on a tight budget, and since versatility is currently more important to me than speed, software emulation of EMS 4.0 memory may be an acceptable solution. Can you help?*

William Albert Stapleton
Tuscaloosa, Alabama

We've been in the networking business 20 years, so you can hook up a PC in a couple of minutes.

A. Because your system is based on a 286, it needs a special chip to manage expanded memory; a 386 has the necessary memory-management capability built in. Of course, you can emulate expanded memory by using a third-party program, such as *Turbo EMS* or *Above Disk*, which swaps data between your hard disk and memory. Using memory configured as a RAM disk speeds up the swapping process. However, in addition to a software emulator's being terribly slow, there are things it can't do that real expanded memory can.

Installing a third-party 16-bit expanded memory board is one way to get the necessary memory management. If you decide to do that, be sure to get a current board. The older versions were designed to run in an AT's 8-MHz bus, not the 30 286's 10-MHz bus. Furthermore, older cards are so tall that the 30 286's system cover won't fit over them. Don't forget that getting the best performance from multitasking managers, such as *Desqview*, involves reducing motherboard memory as much as possible. And your system won't hold less than 512K.

For my money, your best route to real EMS 4.0 expanded memory is the All Chargecard from All Computers. This tiny circuit board slips in between your system's 80286 processor and the motherboard (a PLCC adapter is also required for the Model

(continues)

POWER TIP NO. 60

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If you like to edit single-spaced *WordStar 5.0* documents on screen but print them double-spaced, use the .LH command to set line spacing rather than .LS. Just type .LH16 in the usual locations for dot commands in the document; text displays single-spaced, prints double-spaced, and also requires less disk space.

George Beinhorn
Nevada City, California

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30 286), adding true memory-management capability. That means that all the memory you have—or add—can be used as expanded memory. You'll be able to put device drivers and memory-resident programs into "high" memory to free user RAM for larger programs and data files, give DOS more than 640K, process more data with programs written to use expanded memory, and finally be able to reap the full benefits of multitasking managers.

The Chargecard does not add memory to your system. I assume you have 512K now. Adding another IBM 0.5MB Memory Module Kit will fill the motherboard; any additional memory will have to be on a memory adapter (read *expensive*). You're probably better off swapping the current 512K (stow it for the future) for a 2.0MB Memory Module Kit; that'll leave room for another 2MB on the motherboard. If you want more than 4MB, you can buy the Multifunction Adapter with one or more 2MB Memory Modules installed, move the motherboard's 4MB to the adapter, and reinstall the motherboard's original 512K.

WHERE TO BUY

All Chargecard
All Computers
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M4T 1L9 Canada
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REQUIREMENTS: pin-grid array 80286, or $100 adapter for an 80286 in either a leadless chip carrier (LCC) or a plastic leaded chip carrier (PLCC)
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EXTENDED WARRANTY: none
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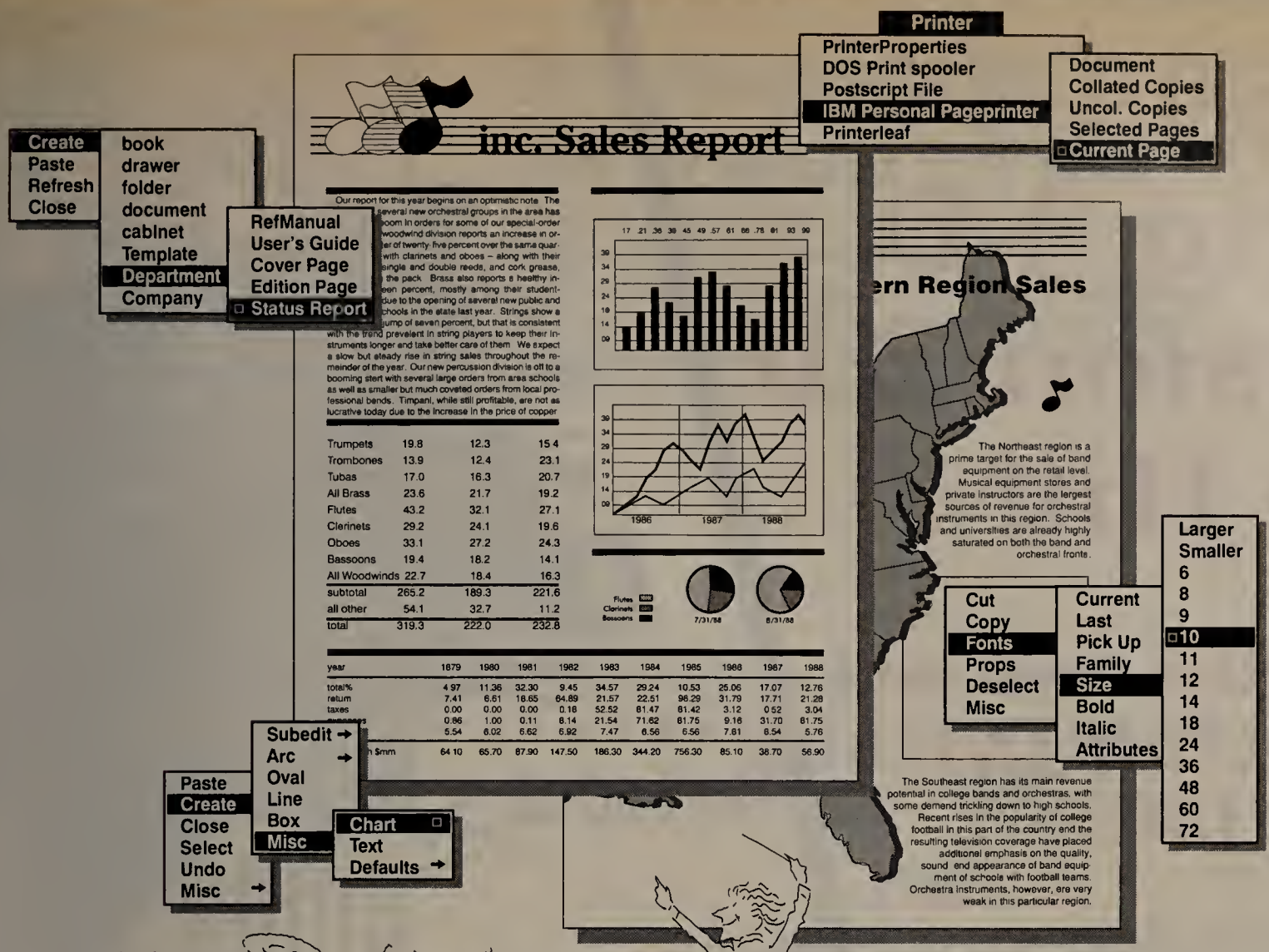

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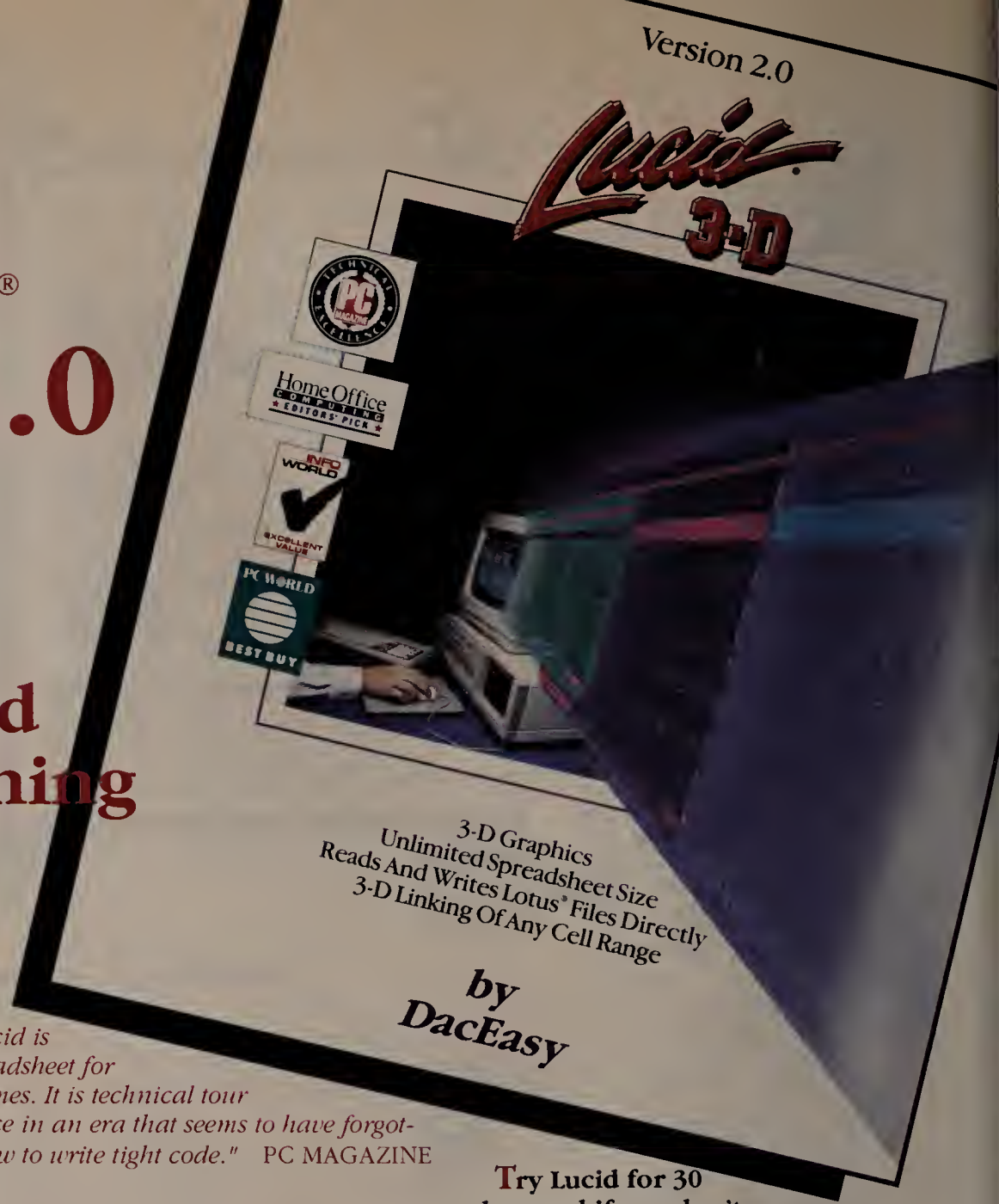

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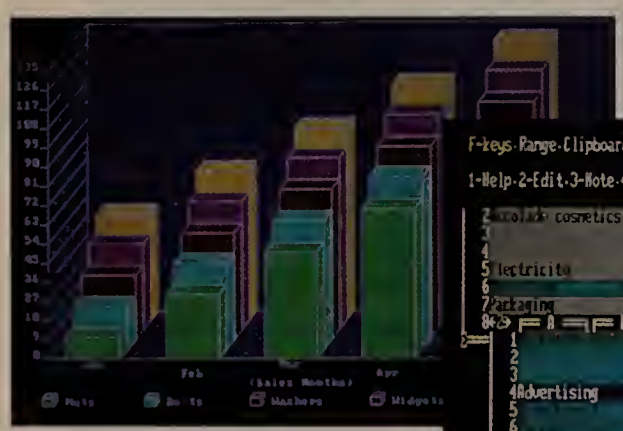

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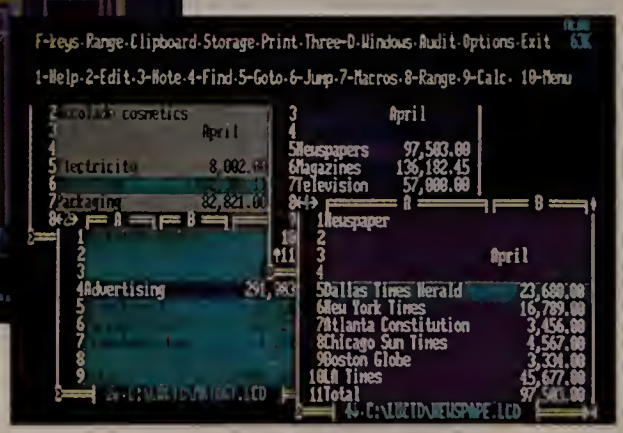

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WINDOWS JOURNAL

First-hand dispatches from the Windows front

Why aren't there more games for Windows? Maybe because software developers don't think it's a serious environment yet.

Stewart Alsop

Have you noticed the scarcity of *Windows* games on the market? Probably not. But to my knowledge, only three *Windows*-based games are available. This is a real problem for Microsoft and an opportunity for all you closet game developers. Microsoft should welcome more games for *Windows*, even though it's supposed to be a business environment.

Before I explain why, let me tell you about the games that do exist. The first and cheapest is *Reversi*, which comes with every copy of *Windows* and is a version of the popular board game *Othello*. The object is to place colored pieces on an electronic board, surrounding the computer's pieces and covering more squares than they do. Meanwhile, the computer, which is infinitely faster and much smarter than you are, busily surrounds your pieces. After three years of futzing around with *Reversi*, I still haven't mastered it.

The second game developed for *Windows* and the first for sale in retail stores was *Balance of Power* from Mindscape. Created originally for the Macintosh, the program lets you imagine you're the president of the United States or the premier of the Soviet Union and challenges you to meet your goals without starting a nuclear war. *Balance of Power* is a certified hit, having sold more than 100,000 copies.

The third game, which I discovered only recently, is *Windows Backgammon Deluxe* from E. F. Dickey. It's a pretty accurate reproduction of backgammon—you play against either the computer or another person. But it's cluttered with dialog boxes, and you'll probably romp through it in no time flat. In easy mode, it's one dumb backgammon player; even in hard mode, I haven't lost yet.

Why Games Are Important

That's it for you game players who happen to use *Windows*. Of course, you might be able to play DOS games by launching them from within the environment (although that tactic usually doesn't work, since game developers tend to play loose with programming rules) or by quitting *Windows* and then launching the game (which defeats the idea of *Windows* in the first place). But the dearth of *Windows* games does a lot to explain why the environment hasn't been too successful in the business world.

It may seem illogical to say that a business environment needs lots of games to succeed. But empirical evidence indicates it does. The three most successful business environments (the Apple II, from 1980 to 1983; DOS systems; and the Macintosh) were blessed with serious, state-of-the-art entertainment software early on when they weren't considered great game machines.

Two imperatives make the development of game software crucial to the acceptance of a new environment—particularly a graphic environment like *Windows*, where you enhance existing equipment instead of buying an entirely new machine.

Game Developers Need Sales

First, it's a simple fact of life that game developers need sales of at least 30,000 to 50,000 units in the first six months of a product's life to turn a profit. Game developers aren't stupid—they won't spend their lives creating wonderful games that nobody will buy. By contrast, small,

(continues)

ANTHONY RUSSO

Seven ~~Six~~ easy ways to boost your BASIC

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So who cares that BYTE magazine calls **PROBAS** a "Supercharger for QuickBASIC" or that PC Tech Journal says that **PROBAS** is a "high-quality, high-quantity package"? Who buys a product just because Jerry Pournelle said "Anyone doing serious QuickBASIC programming would do well to get [**PROBAS**]"? And who cares that Wayne Hammerly calls **PROBAS** "The greatest thing since sliced bread"?

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business-oriented developers can make a decent living selling under a thousand units a year. So it's fairly easy to get a few business applications for almost any environment.

Now look at *Windows*. In its first three years, *Windows* has attracted about 200 business applications, mostly specialized. In that same time, we've seen only three games. Now compare *Windows* with the Macintosh: Even though Apple actively discouraged game software for the Macintosh in 1985 and 1986—because it wanted to position the machine as a "serious" business computer—a number of companies, most notably Silicon Beach Software, became successful by selling Mac games.

Pushing the Envelope

The second reason game software development is crucial to *Windows* is that game developers push the machinery much harder than business developers. One reason DOS games often crash is that developers have had to play incredible technical tricks to make them exciting. In the process game developers find out things about programming that business developers would never discover on their own.

So what, you ask? First, such knowledge gets disseminated through the industry grapevine and eventually shows up in business products. But more important, smart developers of hardware and operating systems track innovations in games and enhance their own products in response to them. Ultimately, computers get more interactive and fun to use, even with business software. An environment that doesn't accommodate such innovations won't support the really challenging games.

Balance of Power, for instance, suffered in translation from the Macintosh to *Windows*. The reason: *Windows* did not allow the developer to create an irregular shape on the screen that the user could activate. So instead of letting users click anywhere within a country's borders on the game map, the developer had to tag each country with a retangular button. This requirement made interacting with the map more difficult and error-prone. Ironically, developers of the latest kind of graphical business software are struggling with limitations like these right now, even though the developers of *Balance of Power* struggled with them in 1986.

Are We Having Fun Yet?

Windows seems to have satisfied the imperative for unit sales. Microsoft claims it is selling 70,000 units of *Windows* per month through retail channels (not including copies bundled with computers like the Zenith or the Apricot). That's getting serious. Apple sells about 80,000 Macintoshes per month. IBM alone sells about 120,000 PCs per month. At 70,000 copies a month, you'd think that *Windows* would start attracting developers, but it hasn't yet. And it hasn't because of the second imperative: *Windows* is a lousy game environment. If Microsoft wants to win the war for the business desktop, then it has to give *Windows* the ammunition to win the game wars, too. ●

Stewart Alsop is editor and publisher of P.C. Letter *and a contributing editor for* PC World.

Unleash the BASIC Power of Hypertext!

Our latest BASIC-booster includes the first hypertext engine designed to be called from BASIC. With the **ProBas HyperHelp ToolKit** you can use the hypertext engine to put one or more manuals on-line with full hypertext search facilities. Imagine having one or more manuals on-line with all of the fantastic hypertext abilities in the QuickBASIC 4.5 compiler and then some:

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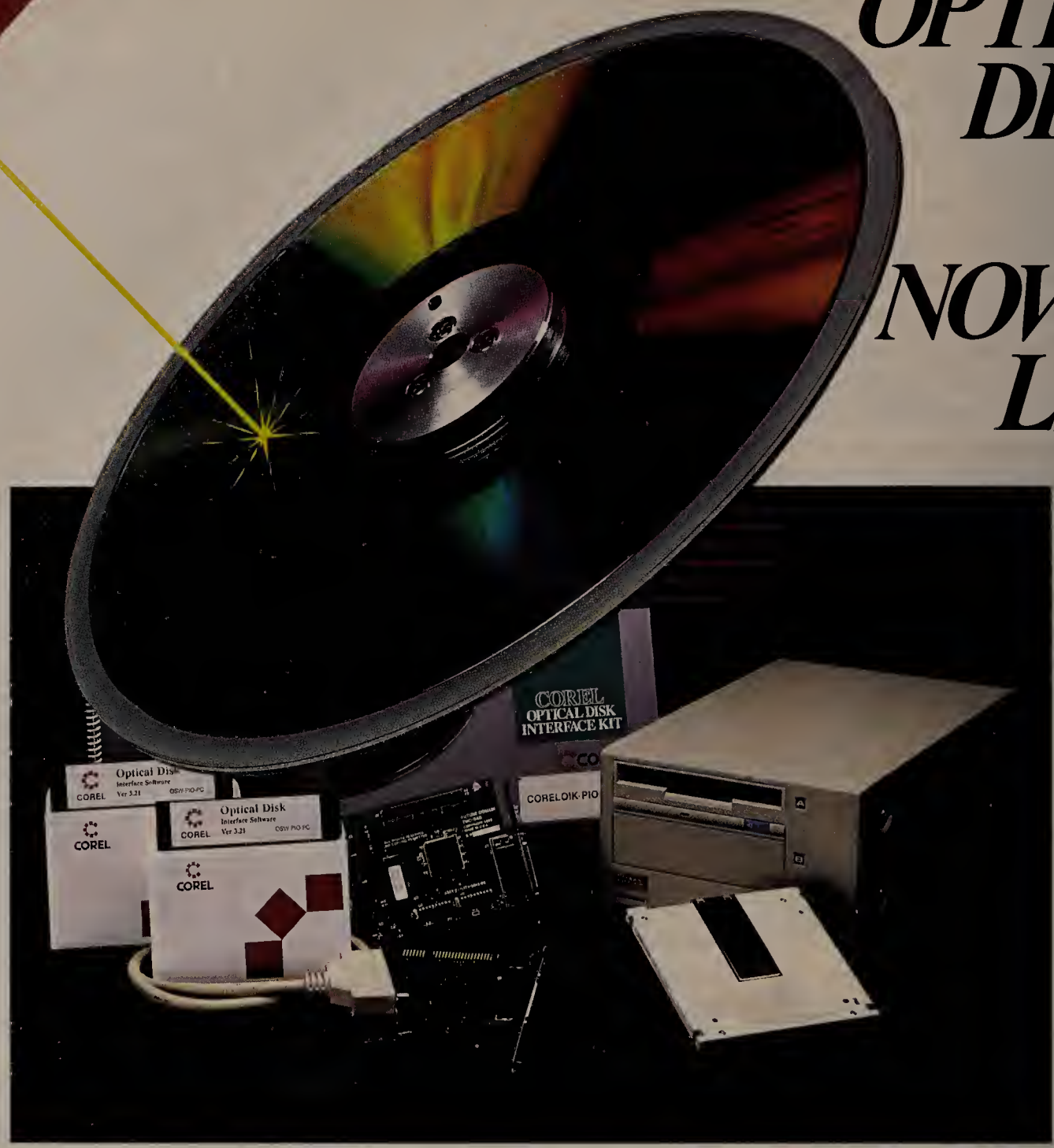

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Circle 48 on reader service card

Edited by ERIC BENDER

Desktop Fusion?

Workstations, PCs Collide

New Software Choices Benefit Users

Sun workstations are broadening their appeal beyond technically oriented customers, claims George Symons.

ED KASHI

In presentations to stock analysts, Austin Wing Mayer, Sun Microsystems' director of investor relations, depicts the company as the most brilliant star shooting across the computing universe. Mayer cites both financial and manufacturing statistics to show that traditional minicomputer suppliers are suffering from a bad case of Sun burn.

But the numbers look a little less stellar for Sun's imminent collision with PC market highfliers Compaq, Apple, and Next. Like Sun, Compaq and Apple are among the fastest-growing companies in the history of U.S. business, and their manufacturing capabilities more than match Sun's. Next—well, Next has superstar Steve Jobs, who is determined to prove that lightning can strike twice.

The collision of this quartet could result in the first incidence of fusion on the desktop. And the competition should benefit PC users no matter who wins.

Full engagement won't occur for a year or so, predicts Bill Lempesis, senior analyst at Dataquest in San Jose, California. But PC makers have already declared open season on minicomputer and workstation vendors. Apple, Compaq, and other suppliers like IBM and Zenith are starting to siphon off business for technical workstations, multiuser systems, and network servers. Prices for the high-speed 32-bit PCs are way below what the DECs and Data Generals can offer. Open architecture provides flexibility that mini/workstation vendors can't match.

Except Sun—which has been flattening the competition with its broad-based UNIX environment and prices that match PCs'. Its ads leave little doubt as to Sun's target; they describe Sun's year-old 386i computer as "the corporate 386" and the company's new RISC-based SPARCstation as *(see Workstations, p. 58)*

IBM Debuts Office Suite

Hopes to Overcome Slow OS/2 Start

As the second anniversary of OS/2's debut rolled around this spring, IBM and Microsoft were still singing the praises of their next-generation operating system. But they were beginning to sound like an a cappela choir of two.

Most of the proverbial early adopters haven't been adopting. The first round of character-based OS/2 applications have drawn relatively few entries, and sales have been minuscule. Applications built for OS/2's Presentation Manager graphic user interface remain months away, and their prototypes lack some key adjuncts—not just helpmates like OS/2 data base server software, but even *(see IBM, p. 60)*

Workstation Wars

Features	Compaq 386/25	Mac IIx	Next	Sun 386i/250
Price	$10,674	$7669	$9995	$14,490
Processor/MHz	80386/25	68030/16	68030/25	80386/25
Operating system	DOS, Xenix	Finder, A/UX	UNIX	UNIX
Standard memory	1MB	4MB	8MB	8MB
Storage	110MB	80MB	256MB	91MB
Monitor, ethernet	no	no	yes	yes

Compaq and other PC vendors, along with Apple, Next, and Sun, are joining the battle for workstation sales. Because each vendor takes a different slant on bundling software and hardware, direct price comparisons may not be useful.

Workstations

(continued from p. 57)

"the world's most powerful desktop for the price of a PC."

Similarly, Next, which was launched last October with the dubious charter of bringing $6500 UNIX machines to colleges, took a hard right turn this spring by inking a $100 million distribution agreement with Businessland. Next already had impressive technology in its black cube—a Motorola 68030-based computer with 8MB of memory, 256MB of read/write optical storage, and extraordinary object-oriented programming tools on a UNIX platform. Overnight, the Businessland deal gave Next corporate credibility and one of the nation's best sales and support organizations.

Analysts don't anticipate any knockout blows in this contest, predicting instead that each competitor will find a unique role. In addition to broadly accepted architectures and huge libraries of applications, Apple and the PC vendors can leverage their high-volume, low-cost manufacturing; large advertising budgets; and extremely strong distribution channels. "It really isn't efficient for Sun to sell $7000-to-$8000 boxes direct," notes Lempesis. "Until Sun's products are sold through major PC resellers they aren't a tremendous threat."

In the past year, Sun moved $150 million worth of 386i's through its traditional direct-sales force and some 200 value-added resellers, but these sales took few customers from Compaq or Apple, admits Group Marketing Manager George Symons. However, Sun hopes to expand its user base from 386i- and SPARCstation-equipped engineers to include financial and administrative personnel.

Major PC suppliers like Compaq have built highly automated factories that workstation vendors can't match.

Connectivity will be the major drawing card. The ethernet-equipped Sun workstations are backed by the vendor's ambitious net and windowing environments. They offer levels of file sharing, communications support, distributed processing, and multitasking that neither DOS nor OS/2 PCs can match. For instance, the Sun 386i runs multiple off-the-shelf DOS packages simultaneously; OS/2 systems are limited to a single DOS application. Connectivity can also be enhanced when one vendor supplies all the elements, notes George White, president of multiprocessing computer maker Corollary.

But the lack of desktop software will challenge both Sun and Next. UNIX is a solid, open standard for net workstations, but it lacks the productivity software that has put PCs and Macs on so many desks.

While Sun relies on its ability to run DOS packages, Next figures that the highly productive NextStep development environment will let it leapfrog the current software base and make any debate about operating systems irrelevant. "We gave up worrying about operating systems long ago and started focusing on what the user wants from the machine," says Dan'l Lewin, vice president of sales and marketing.

Many top DOS developers like Lotus, Ashton-Tate, and Aldus will port their applications over to NextStep, and IBM plans to offer a version of NextStep under its 386-based version of UNIX. Ironically, notes Compaq president Mike Swavely, one major impact of the Next and Sun entries might be to help sell UNIX on PCs.
—*Mike Hogan*

Mapping the PC Market

MapInfo Aims for Mass Appeal

At New York's Cortland County Fire Department, dispatchers can type an address into a desktop mapping system and instantly discover if a business stores hazardous chemicals or if an invalid lives at that address. The desktop mapping software also helps plan the best routes to a disaster and presents floor plans to guide rescuers, explains dispatcher David Reynolds.

Designed to let users integrate map and data base information to find street addresses, generate reports, and create pin or thematic maps, desktop mapping packages also aid in many jobs that are a bit more prosaic than fire fighting. Such broad capabilities are sparking quick growth—by some estimates, sales will exceed $1 billion by 1991.

At the forefront of the buying frenzy is MapInfo of Troy, New York, which wants to bring desktop mapping to the masses the way *AutoCAD* deliv-

(see MapInfo, p. 62)

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Multiuser Relational Databases

	(InfoWorld weighting)	Advanced Revelation 1.1	Dbase III Plus 1.1	Dbase IV 1.0	Informix-SQL 2.10.02	Paradox 2.0	Paradox 3.0	Rbase for Dos 2.0	Team-up 2.0
Price (base/single-user)		$950	$695	$795	$795	$495	$725	$725	$795
Performance									
Relationality tests									
Relational data entry	(50)	Excellent	Poor	Poor	Very Good	Excellent	Excellent	Excellent	Very Good
Relational reporting	(75)	Excellent	Poor	Very Good	Very Good	Excellent	Excellent	Excellent	Excellent
Relational querying	(50)	Excellent	Satisfactory	Good	Excellent	Excellent	Excellent	Excellent	Good
Programming language	(100)	Very Good	Good	Very Good	Excellent	Very Good	Excellent	Very Good	Very Good
Speed tests									
Standard operations	(50)	Satisfactory	Good	Very Good	Satisfactory	Good	Good	Good	Poor
Mixed-use model	(75)	Good	Poor	Good	Very Good	Good	Very Good	Excellent	Good
Transaction model	(75)	Very Good	Poor	Very Good	Excellent	Good	Satisfactory	Satisfactory*	Very Good*
Documentation	(75)	Good	Good	Poor	Excellent	Very Good	Excellent	Excellent	Good
Ease of learning	(50)	Poor	Poor	Satisfactory	Very Good	Excellent	Excellent	Excellent	Very Good
Ease of use									
Basic	(75)	Poor	Satisfactory	Very Good	Satisfactory	Excellent	Excellent	Excellent	Very Good
Multiuser features	(50)	Very Good	Unacceptable	Good	Excellent	Excellent	Excellent	Excellent	Very Good
Error handling	(150)	Very Good	Poor	Poor	Excellent	Very Good	Excellent	Good	Excellent
Support									
Support policies	(25)	Satisfactory	Good	Good	Poor	Good	Very Good	Very Good	Poor
Technical support	(50)	Very Good	Very Good	Satisfactory	Very Good	Good	Satisfactory	Very Good	Excellent
Value	(50)	Good	Unacceptable	Good	Very Good	Excellent	Excellent	Excellent	Excellent
Final scores		**6.8**	**3.5**	**5.4**	**8.3**	**8.1**	**8.9**	**8.5**	**7.8**

InfoWorld, April 10, 1989

The bottom line is 8.9

InfoWorld magazine tested and compared multiuser databases. With a bottom line score of 8.9, Borland's new Paradox® 3.0 beat the well-knowns and unknowns hands down.

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BORLAND

Code: MP63

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Circle 65 on reader service card

IBM

(continued from p. 57)

the ability to connect to most printers. (Microsoft, which worked with glacial speed on *Windows* device drivers, has moved slower yet on the Presentation Manager.)

Given the technical barriers for PM packages and customers' sticker shock at multimegabyte memory upgrades, most software firms have drawn back from full-bore PM development. Instead, they've concentrated on opportunities with DOS and the suddenly popular "DOS extender" tools that allow single-tasking programs to jump the 640K memory barrier.

But IBM hopes to push OS/2 back onto center stage with a new suite of office automation software and upgrades to OS/2 itself—particularly the proprietary Extended Edition. And with memory costs finally sinking, IBM has begun awarding rebates for purchases of OS/2 plus memory or selected other options.

The new office automation family, *OfficeVision*, is one of those sweeping Big Blue projects—in this case occupying a thousand developers for about two years. *OfficeVision* will run on IBM's four strategic platforms: OS/2 nets, AS/400 minicomputers, and VM and MVS mainframes. Debuting in September and requiring OS/2 Extended Edition, the $750 *OfficeVision/2* for OS/2 LANs will include file manager, electronic mail, address book, phone book, and text editing functions.

OfficeVision is not just an application family but rather an environment with hooks that allow applications from IBM and third-party developers to "snap in" and exploit modules like E-mail. Industry analysts generally applaud both this thrust and the scope of the project, which by late 1990 should bring from 5 to 5000 users the same office services under one interface. "*OfficeVision* has been thought out really well," says Judith Hurwitz, senior analyst at Patty Seybold's Office Computing Group in Boston.

OS/2 is the desktop foundation for this graphic, multitasking, memory-intensive offering, emphasizes Lee Reiswig, director of software strategy at IBM's Entry Systems Division. "It's not possible to build *OfficeVision* the way it is with DOS—even with *Windows* and [expanded memory] or anything else.

IBM's Lee Reiswig expects a solid crop of OS/2 packages this fall.

"We've been trying to sell an operating system for the past two years, and it's tough to do," Reiswig acknowledges, but applications finally are arriving. "This fall, most leading applications will be exploiting OS/2 in a big way," adds Reiswig. "When we've got enough of them, our emphasis will turn to solutions—capturing hearts and minds."

But while IBM and Microsoft harmonize on OS/2 Extended Edition, Standard Edition appears to lack audible support. "IBM's kind of washing its hands of Standard Edition," Hurwitz says. Other leading PC suppliers, waiting for an 80386-specific version of the operating system, currently give OS/2 little more than lip service. —*E. B.*

Patent Waters Muddied

Software Coverage Alarms Industry

No stranger to controversy, the U.S. Patent Office has raised a ruckus in recent years by granting patents for software. This spring when Quarterdeck Office Systems received a patent for a way to write multiple applications to windows, much of the software industry spouted doom-and-gloom forecasts.

The turmoil quickly subsided when people received copies of Quarterdeck's patent. "It's a joke—the people who made the dire predictions had never seen the patent," says Jeffrey Tarter, editor of *Soft-letter* in Cambridge, Massachusetts. "The actual patent is so narrowly constructed that it's unlikely anything infringes it."

Industry concern resurfaced with a vengeance a few weeks later, however, when Xerox took an aggressive stance on requiring licenses for the user interfaces covered by its patents and copyrights. And the Patent Office, which has awarded precious few software patents, appears to be stepping up its issuances.

There's plenty of reason for concern—particularly because patents cover ideas, rather than the expression of ideas as do copyrights. If the idea is basic enough, there's no way to engineer around it. Moreover, patents may be legal time bombs: patent applications are kept secret, and the process typically takes three or more years, so patents could be infringed unknowingly for years.

"It's a mess and it's getting messier fast," comments Richard Stern, a computer lawyer in Washington, D.C. Stern formerly told software clients to get copyrights rather than patents, which weren't worth the time or the money. "But I don't say that anymore, when the Patent Office just issues any old thing," he says. Stern cautions, however, that "we don't know that these are valid patents—they may well be overturned by the courts."

(see Patents, p. 62)

YVONNE HEMSEY

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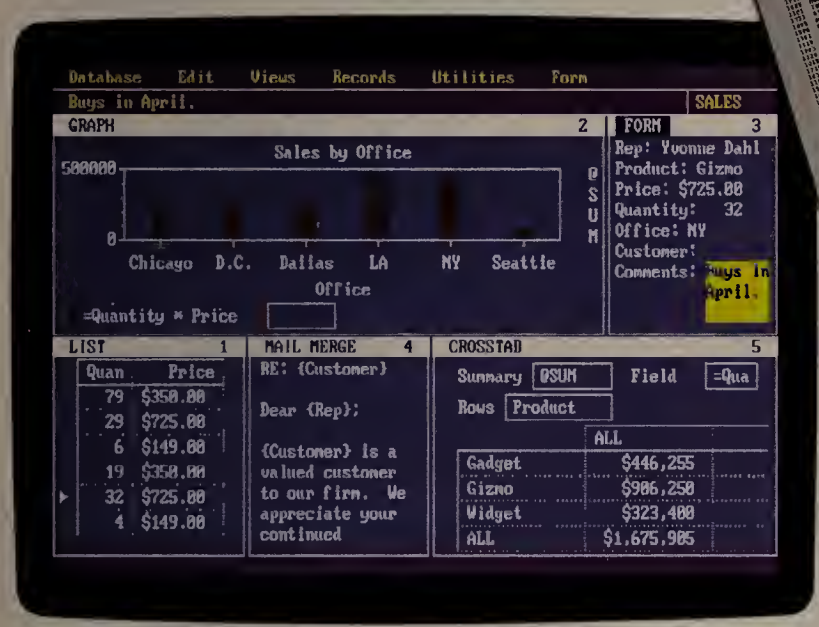

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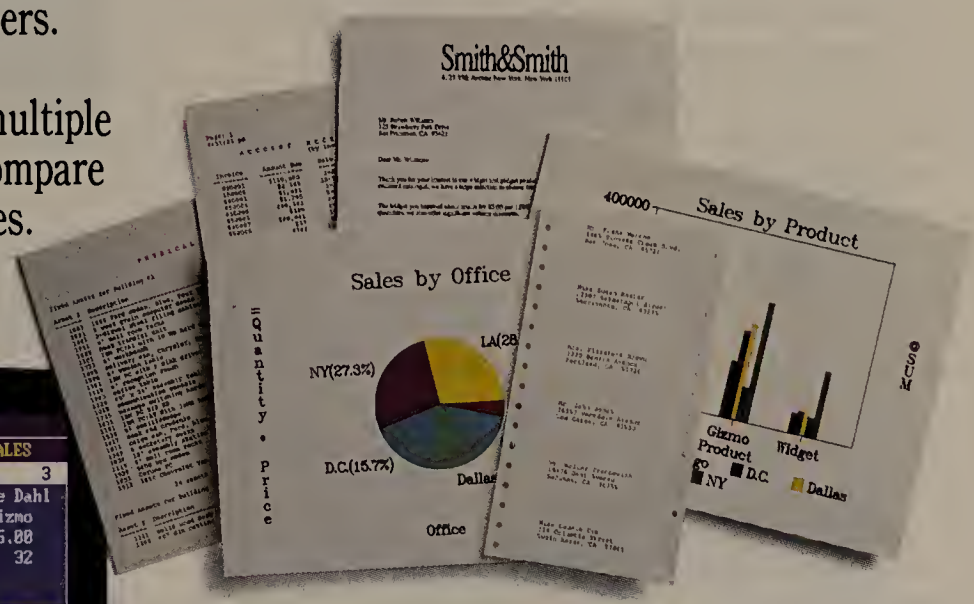

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Circle 64 on reader service card

MapInfo

(continued from p. 58)

ered computer-aided design, says President Sean O'Sullivan.

O'Sullivan and partners conceived *MapInfo* four years ago as students at Rensselaer Polytechnic Institute. They delivered the product in fall 1987, and in the first full year of sales, MapInfo grossed several million dollars. The 35-person company has been profitable since the software shipped.

Roughly two-thirds of sales go to businesses (particularly utility, distribution, and delivery firms) and one-third to government. A newly formed network of 165 third-party resellers tailors *MapInfo* for specialized jobs such as school bus routing or evacuation management.

Unlike simple thematic-mapping packages, *MapInfo* offers powerful ways to link data bases (including standard *dBASE* files) with graphics. And unlike traditional geographic information system (GIS) offerings, O'Sullivan claims, it lets users "immediately begin using existing data base information to create maps without an extensive training period." The base package costs $750 and includes U.S. and world maps as well as national 5-digit ZIP code maps. Other maps of metropolitan and rural areas are sold separately. Locations are identified by street address, ZIP code, city, state, county, census tract, or other user-defined criteria. The data bases can then be queried and the information displayed and manipulated to create maps showing anything from street-level detail to floor plans.

With version 4.0, which shipped in May, customers can share *MapInfo* data bases on a PC net. Map changes can be highlighted for other users, and users can edit different layers on the same map (for example, the water department can study piping diagrams while the fire department reviews street addresses).

"We're oriented toward multiple platforms, multiple operating environments, and multiple data base architectures," says O'Sullivan, who plans to port *MapInfo* to UNIX and OS/2. However, that move may intensify competition with established vendors of GIS packages. Although they shrugged off *MapInfo* at first, these rivals, whose PC-based products cost from $8500 to $50,000, are now taking note.

The GIS vendors contend that packages like *MapInfo* simply lack horsepower for data analysis and management.

MapInfo's Sean O'Sullivan aims to offer easy ways to integrate digital maps with existing PC data bases.

GARY GOLD

"Once users realize the limitations of desktop mapping products, they start looking for something more powerful, such as the GIS approach, where a data base is built and a map is one view on the data base," claims Jack Dangermond. The president of Environmental Systems Research Institute in Redlands, California, which markets *PC ARC/info*, Dangermond adds that GIS packages let data bases migrate up to minicomputers and mainframes.

But O'Sullivan doesn't expect to go head-to-head with GIS products, which he says are geared toward selected users in technical vertical markets. "We've got a horizontal, somewhat generic product that appeals to a lot of different applications. There will always be room for the $90,000 solutions, and for us." —*Laura Lang*

Patents

(continued from p. 60)

Developers need to protect their intellectual property rights, but copyrights may not furnish the answer either, despite lawsuits that push copyright coverage to the limits. Ashton-Tate's suit against Fox Software offers one illustration—nobody had previously argued that computer languages could be protected by copyright, "and lots of law stands in the way," Stern says.

The only conclusions to draw from today's prominent copyright cases are that lawyers are prospering and that "doing a straight knockoff will get you killed," Tarter says. "I suppose the net result is a modest increase in creativity in interface design." (Case in point: In *OfficeVision*, IBM replaces the familiar trashcan icon with a shredder.)

Stern suggests that revamping federal law might be better than an onslaught of all-or-nothing court battles. "There must be some intermediary solutions," he says. Those seeking a model might look to recent legislation establishing a separate legal regime for chip design. —*E. B.*

Mike Hogan is PC World's *news editor, and Laura Lang is a freelance writer in Lakewood, California.* ●

TWO-FISTED MANAGEMENT
I AM SMILING
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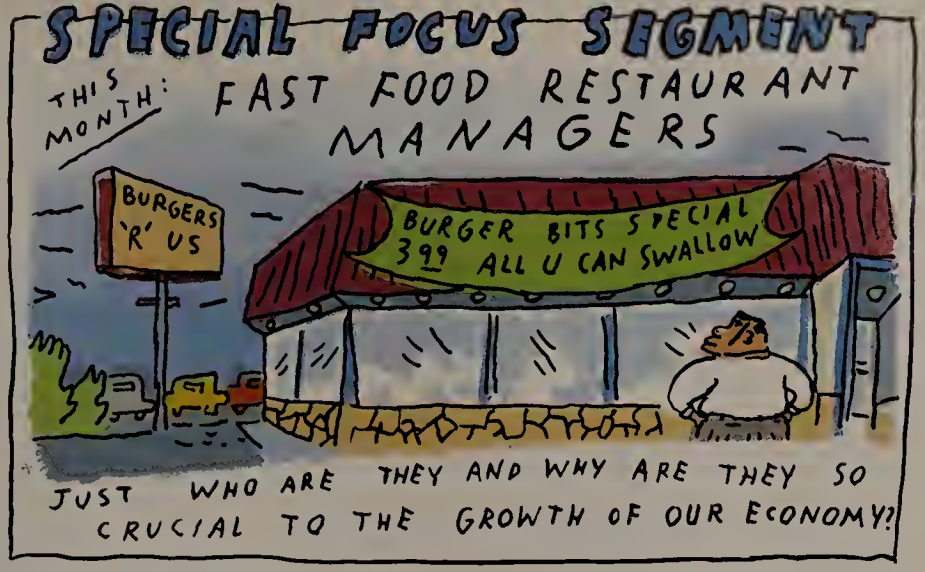
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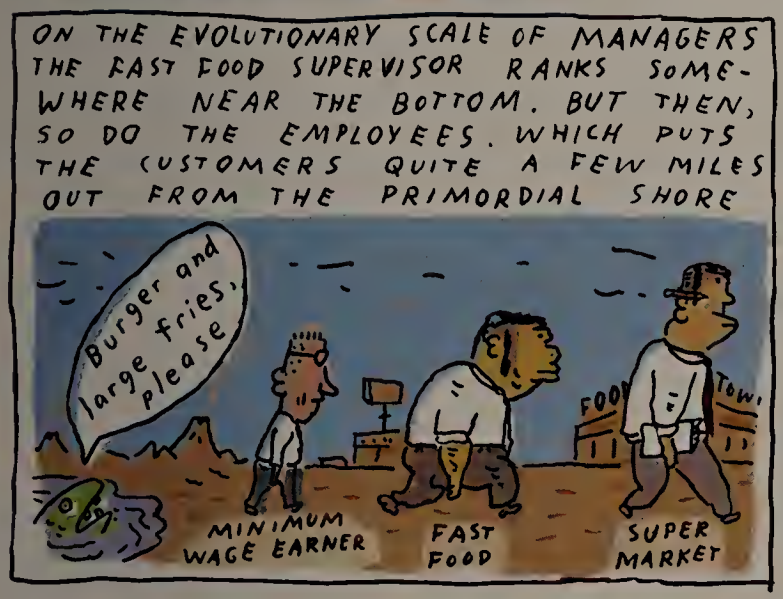
ON THE EVOLUTIONARY SCALE OF MANAGERS THE FAST FOOD SUPERVISOR RANKS SOMEWHERE NEAR THE BOTTOM. BUT THEN, SO DO THE EMPLOYEES. WHICH PUTS THE CUSTOMERS QUITE A FEW MILES OUT FROM THE PRIMORDIAL SHORE
Burger and large fries, please
MINIMUM WAGE EARNER
FAST FOOD
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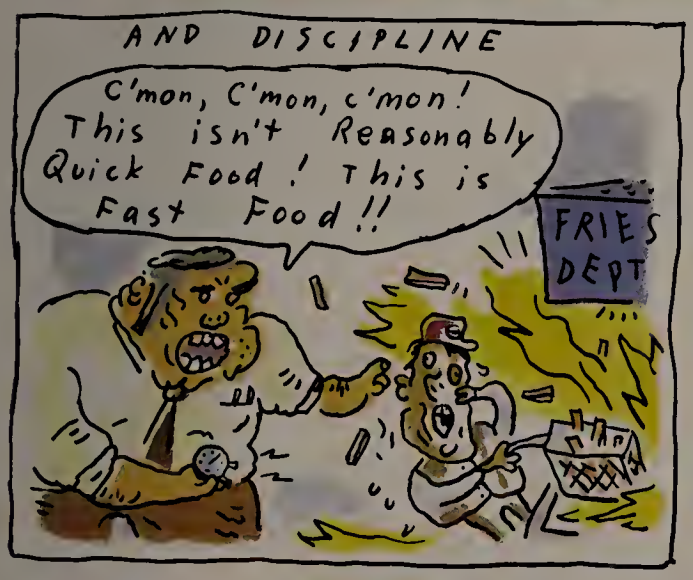
STILL, HE SHARES SOME TRAITS WITH HIS MORE FORTUNATE CORPORATE COUSINS. LIKE BUSINESS SAVVY.
Begly, we'll run the 2 for 1 Fluffy Muffin special this week
Delwood, put off the Teeny Tiny Toy freebie. The timing's not right


AND DISCIPLINE
C'mon, C'mon, c'mon! This isn't Reasonably Quick Food! This is Fast Food!!
FRIES DEPT

HE'LL OFTEN ROLL UP HIS SLEEVES AND JOIN THE FRONT LINE
SALADS
COFFEE
Do we have enough ketchup, ma'am? Do enjoy your chopped steak sandwich. Might I suggest our fine window seating overlooking I-35?

HIS CELLULAR PHONE IS FOUND TO BE INDISPENSABLE
We... we're almost out of Secret Sauce! Whatta we do?...
Make some more!
... You... you never gave us the secret

HE'S UNDERPAID, OVERWORKED, AND THE EMPLOYEE TURNOVER RATE IS THE HIGHEST OF ANY BUSINESS. SO WHY DOES HE DO IT?
DISTRICT MANAGER
In recognition of...
"BUN OF THE MONTH" AWARD
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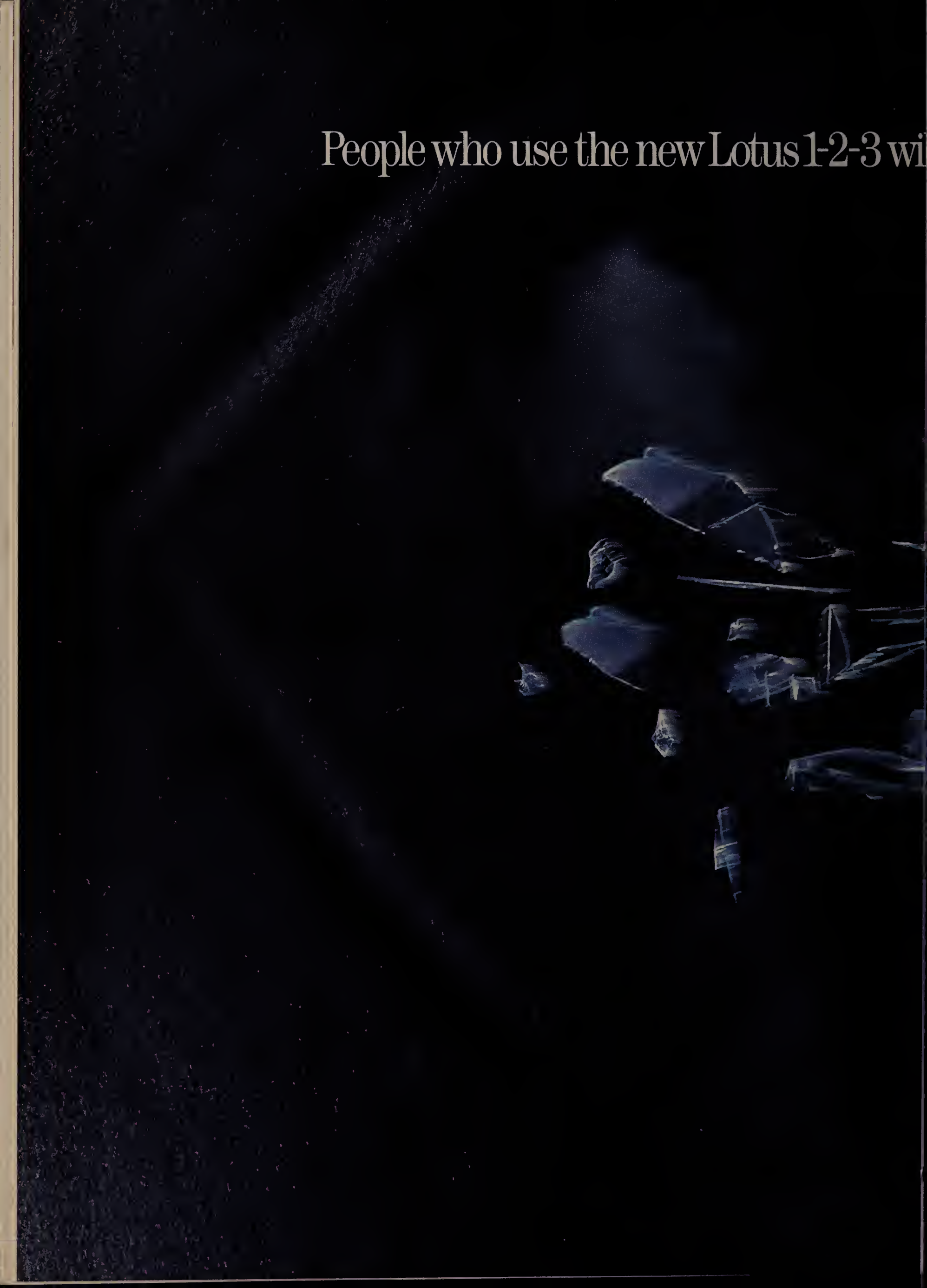
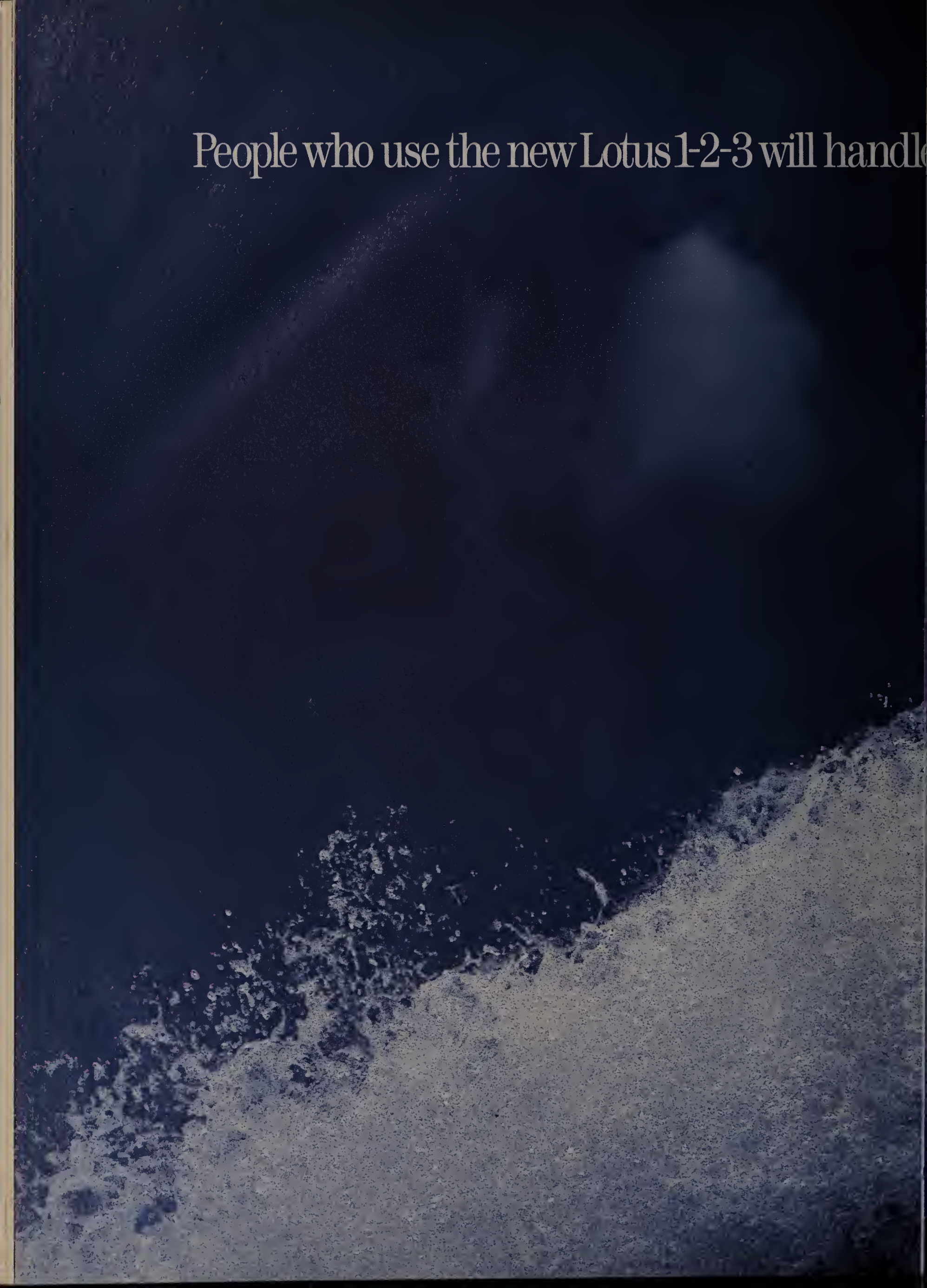
CLAP CLAP
REGIONAL MANAGER

MARK MAREK


People who use the new Lotus 1-2-3 wi

have more power than ever before.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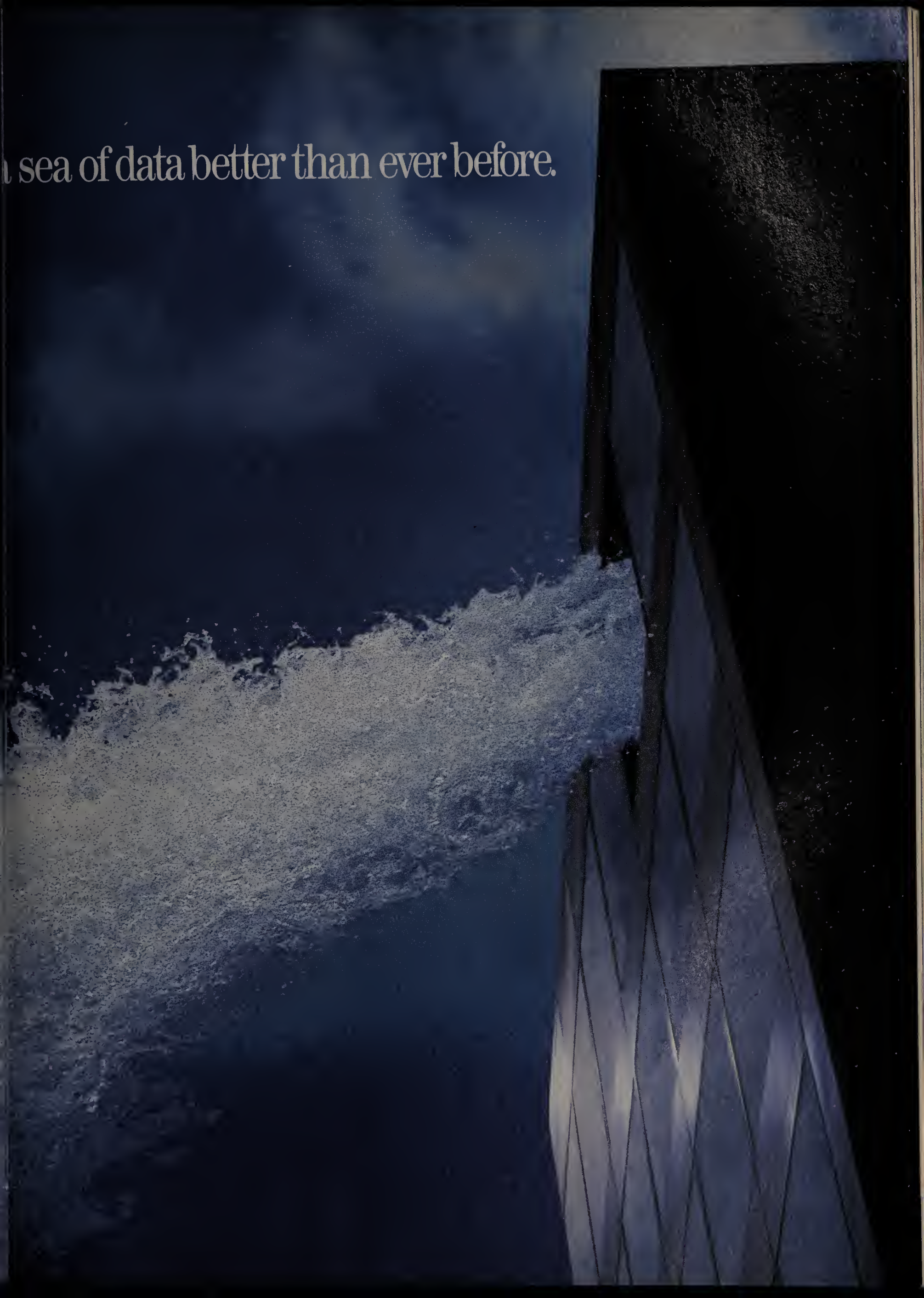
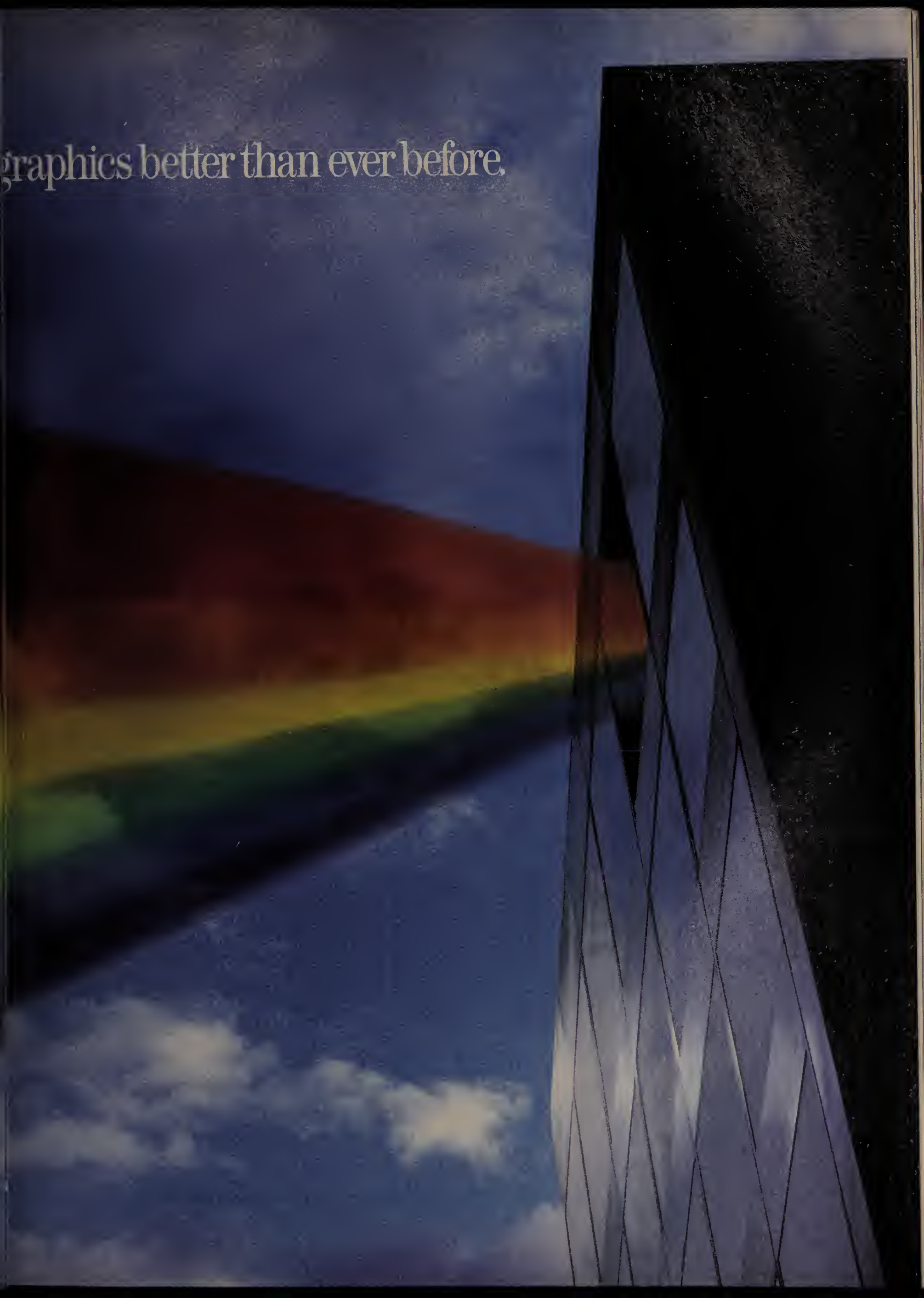
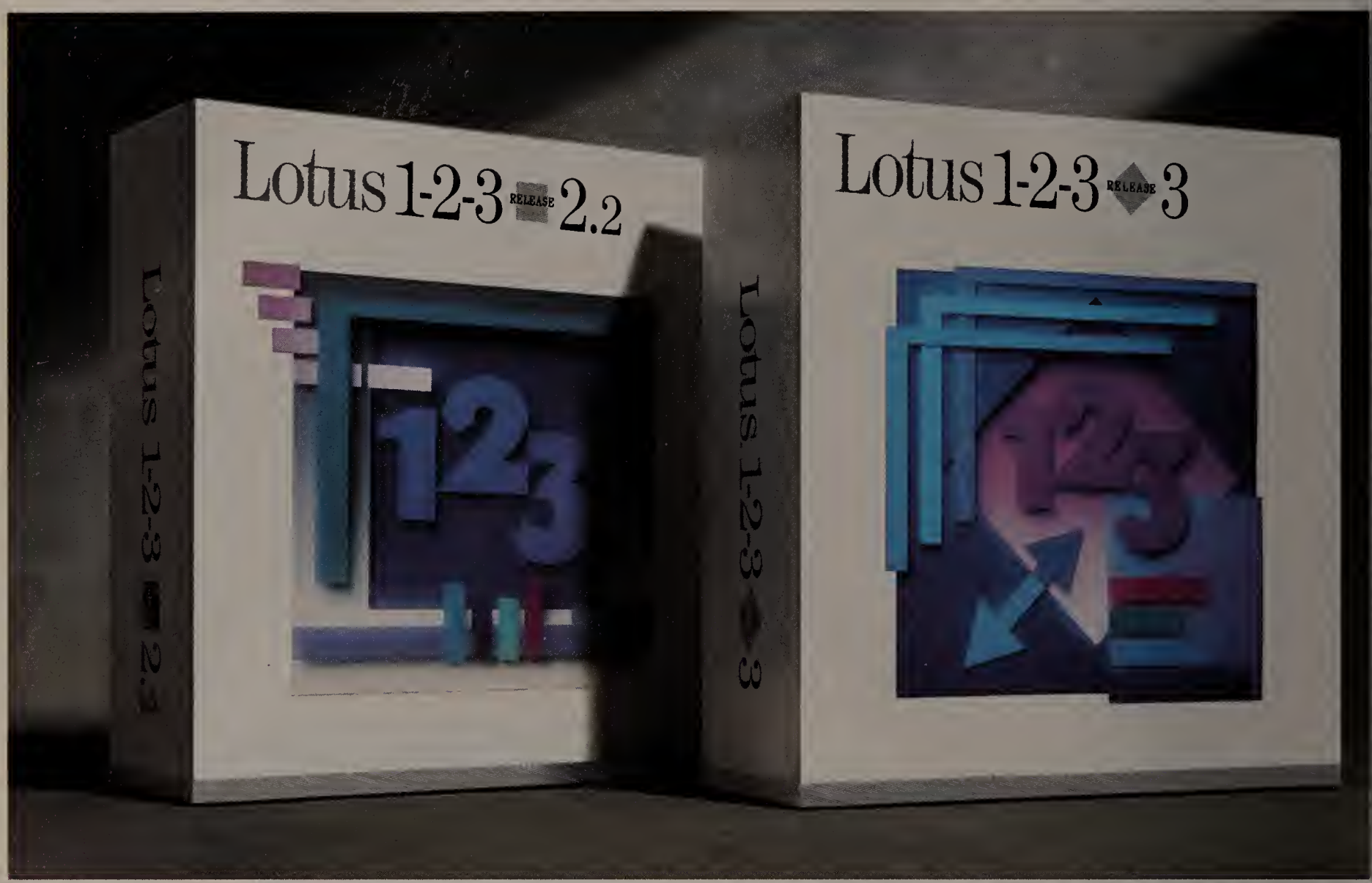

sea of data better than ever before.

People who use the new Lotus 1-2-3 will create busines


graphics better than ever before.

Introducing the new Lotus spreadsheet is now bet



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Release 3's 3D design lets you work with multiple sheets and files simultaneously.

Release 3 is nothing short of a breakthrough in software technology.

Its new true three dimensional design lets you organize, analyze and navigate your way through large and complex spreadsheet applications with incredible speed, power and ease.

What makes Lotus's true 3D different?

Well, other spreadsheets provide two axes for you to work with: rows (height) and columns (width). But Release 3 gives you a third axis (depth). So you can perform operations using any spreadsheet function *through* up to 256 worksheets simultaneously.

With a simple tap of a key, you can move quickly between worksheets with no more

1-2-3. The world's leading er than ever before.

difficulty than flipping back and forth between the pages on a note pad.

And the calculation changes you make on one sheet can affect the calculations on all the other sheets.

Equally impressive is Release 3's presentation quality output and its selection of advanced analytical graphics. For example, our HotView graph window allows you to see a spreadsheet and its corresponding related graph on-screen simultaneously.

Release 3's HotView graph window dynamically links your worksheet and related graph.

And you can even graph a 3D range and print text with graphics on the same page.

Release 3's new database has relational capabilities for more in-depth querying. And its Data External command lets you bring data from external databases directly into your spreadsheet without leaving 1-2-3.

Release 3 is now available for DOS or OS/2® users and is designed to fully exploit the 1 Mb memory and processor that is standard on today's 286 and 386-based PCs.

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Because we designed the soon-to-be-released 1-2-3 2.2 to maximize the memory in your PC. 2.2 provides extraordinary speed and presentation quality output, as well as improved analytical power in the way of spreadsheet linking, minimal recalc and undo.

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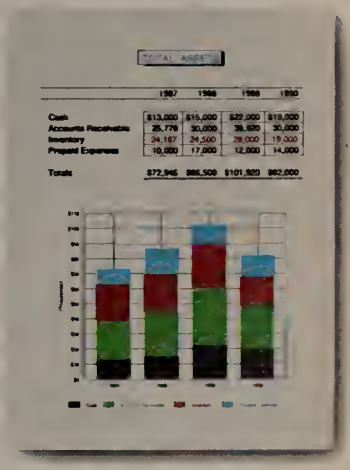


Release 2.2 offers presentation quality output and extraordinary speed.

In the coming weeks, current users will receive upgrade information. If you're not a user, see your Lotus Authorized Reseller.

And experience firsthand how the new Lotus 1-2-3 will help you think smarter. Help you see things more clearly. And help you perform better than you ever have before.

The New Lotus 1-2-3

The spreadsheet of choice

© 1989 Lotus Development Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. OS/2 is a registered trademark of IBM, Inc. 1-2-3 Release 3 runs under DOS or OS/2. Hard disk and 1 Mb system memory required in DOS, 3 Mb in OS/2. Lotus certified compatible PC with 80286/80386 processor required. Release 2.2 runs on PCs of all types in DOS with a minimum of 320K.

Novell Serves Up the 386

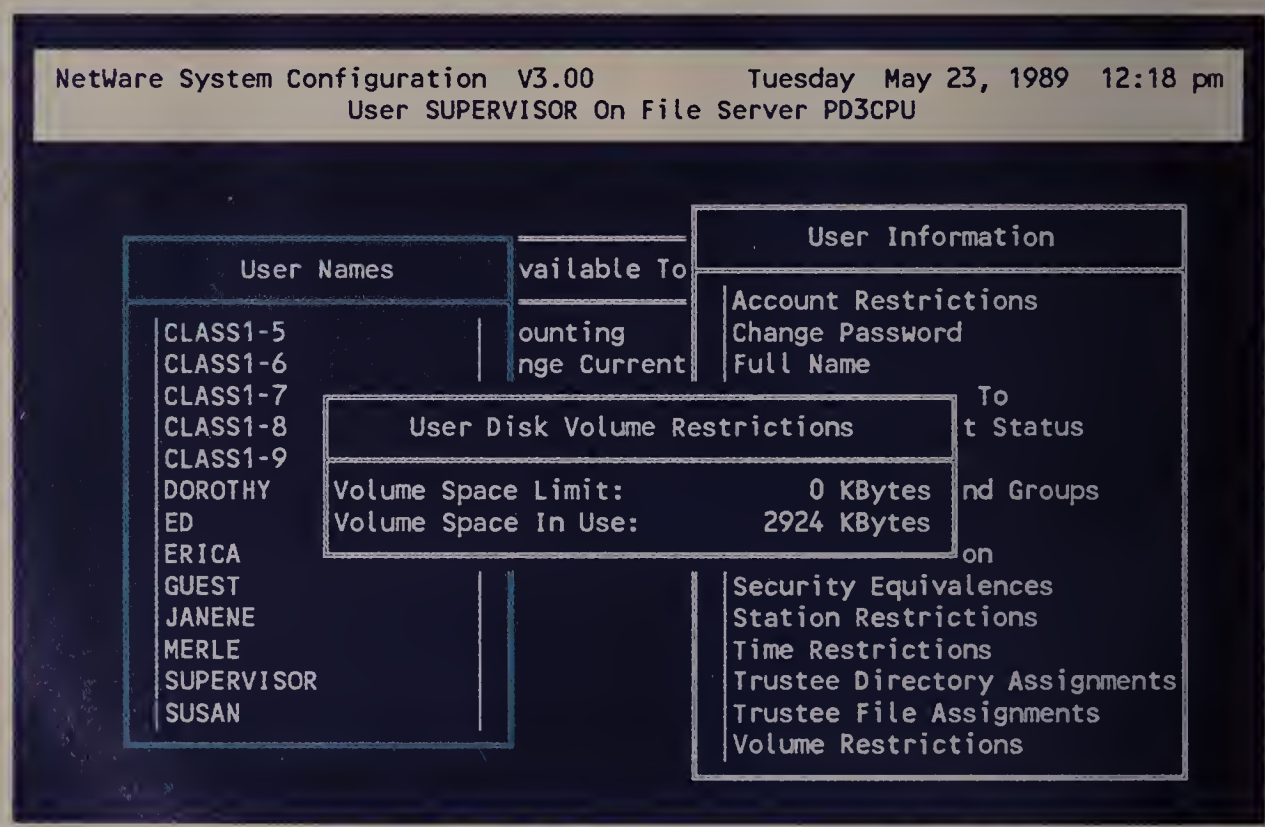
One of the first network operating systems written from the ground up for the 80386, NetWare 386 3.0 combines easy installation with powerful support for up to 250 users.

Michael Goodwin

For years 3Com and Novell have been volleying back and forth on networking's central court, to the great benefit of the network user. *Advanced NetWare 286* was widely considered the network operating system (NOS) of choice—until 3Com came out with *3+Open*, its implementation of Microsoft's *LAN Manager*. Now, with the third-quarter release of *NetWare 386 3.0*, Novell aims for a server ace.

Although most NOSs will run on an 80386 server, until now very few have been recoded from scratch to take full advantage of the chip's 32-bit capabilities. Novell is one of the first companies to do so, and its executives claim that *NetWare 386* is three times faster than its predecessor—and will easily outperform *LAN Manager*–based NOSs like *3+Open*.

Furthermore, Novell's programmers have taken this opportunity to remedy problems (like *Advanced NetWare 286*'s complex, time-consuming installation process) and add capabilities. For instance, *NetWare 386* permits up to 250 users to be attached to a single server (via four network boards) without significant performance degradation—or so Novell claims. (While some NOSs have no official user limit, performance can degrade severely as the number of users grows. If Novell delivers acceptable 250-node operation, which it



Using the familiar Syscon utility, NetWare 386 administrators can now limit the amount of space users can have on the network server.

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

showed *PC World* in its lab, *NetWare 386* will set a new industry standard.)

Installation Without Tears

Novell states that *NetWare 386* can be installed in under 15 minutes—and although that estimate does not include placing network boards in workstations and the server, generating workstation shells, or configuring printers, *PC World* did succeed in bringing up the software, fully configured, in 10 minutes flat—without a manual!

The abbreviated, menu-driven installation process avoids several harsher aspects of *NetWare 286:* the overnight disk surface test, the tedious linking of board and disk drivers, and the necessity to reformat the entire hard disk for *NetWare*. With *3.0* you can leave a DOS partition on your hard disk, no linking is required, and surface testing is strictly optional (thanks to advanced error-handling techniques). You also can reconfigure the network without shutting it down.

In addition, you no longer need to guess at the right settings for parameters like disk cache buffers, directory cache buffers, and so on. The NOS optimizes them automatically for changing levels of network activity.

Old Face, New Features

Once *NetWare 386* is up and running, you'll notice that most of *NetWare 286*'s familiar, menu-driven utilities for administration, print handling, and so on are still in place, looking and working much as they did before. But extra menu selections point to a number of significant new features.

For instance, *NetWare 386* has been bolstered by numerous security options. The administrator can now limit the disk space users can have on the server and control access to individual files. Unauthorized applications can be kept from running on the server. Password encryption can prevent network "sniffers" from discovering passwords. And work-group managers can exercise full supervisor privileges below a certain subdirectory.

The Workstation–Printer Connection

Novell has made several innovations in printer support. Most important, any LAN user can now access printers attached to workstations (as opposed to the server); up to 16 network printers can be addressed in this way. In addition, a handy Notify feature advises users when a printer is off line or out of paper—or when a print job is ready.

And that's not all. *NetWare 386* lets you install network volumes as large as your hard disk. (In fact, volumes can even span multiple disks.) Unless you want a file zapped permanently for security reasons, deleted files will be automatically retained for possible undeletion (with an easy-to-use Salvage utility) as long as sufficient disk space is available. Moreover, *NetWare 286* workstation shells will still work with *NetWare 386*, and security and user information can be transferred intact.

Several *NetWare 286* add-ons will come free with *NetWare 386*, including disk mirroring and the *Btrieve* data access software. SQL capability, however, will still cost extra.

All software that runs on *NetWare 286* will run on the new platform. The *NetWare 386* server can be any 386 machine with 2MB of memory and a healthy amount of disk storage. The software handles both DOS and OS/2 workstations, and Novell expects it to take no more workstation memory than does *NetWare 286*—the least gluttonous memory hog among the major network players.

Novell plans to release *NetWare 386 3.1* in early 1990, with simultaneous support for multiple transport protocols. The NOS won't provide global name services, however, until late next year.

At $7995, *NetWare 386* costs more than twice as much as its predecessor and most rivals. But Novell has addressed virtually every problem in the justly popular *NetWare 286*—and slammed the ball back onto 3Com's side of the net. ●

Michael Goodwin is an associate editor for PC World.

SNAPSHOT

NetWare 386 3.0

Novell has rewritten its popular network operating system to optimize performance for the 80386—simplifying installation and boosting flexibility.

KEY FEATURES

- **Supports 250 users without undue performance degradation**
- **Installation in 15 minutes or less; disk reformat and surface testing not required**
- **Encrypted passwords**
- **File-level security**
- **Can access printers connected to workstations**

AVAILABILITY

Third quarter of 1989

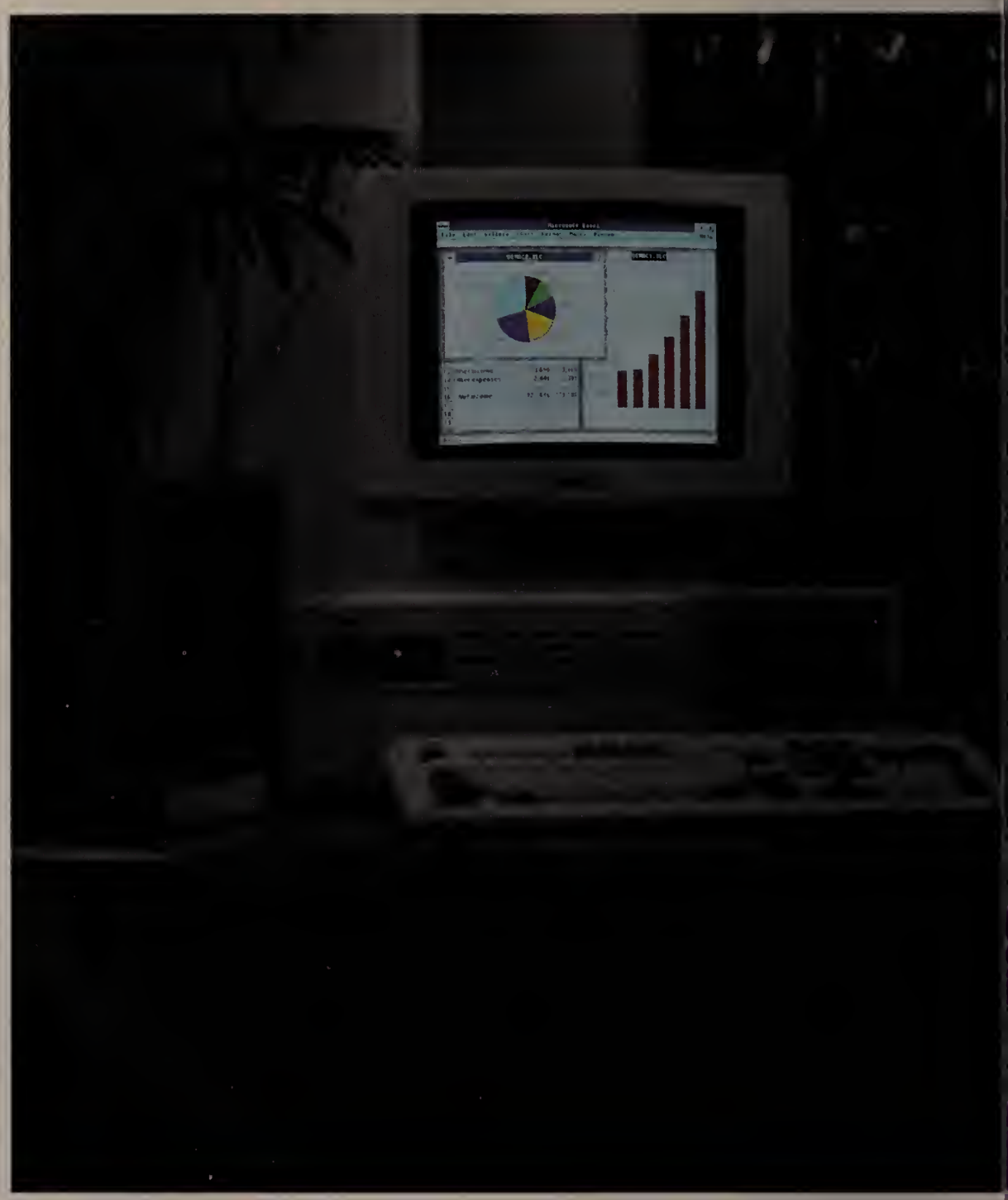
PRICING

$7995 per server

Novell, Inc.
122 East 1700 South
Provo, UT 84601
800/453-1267

Reader service no. 680

How Acer helped a regional firm



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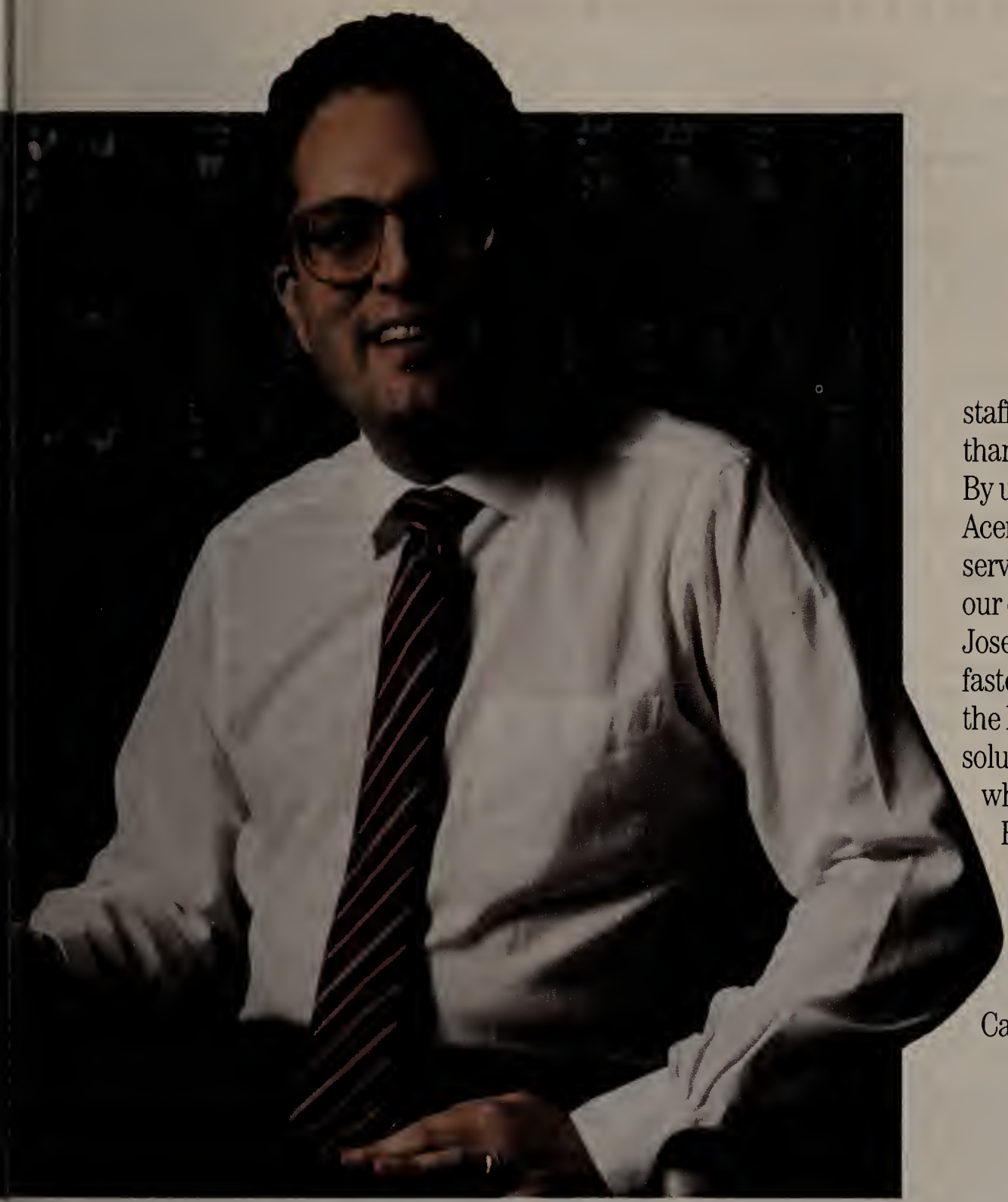

staff, in less than 5 years. By using Acers to service our client base, Stonefield Josephson is working smarter and faster to provide its clients with the highest quality accounting solution for their needs. And that's what good business is all about."

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PCW-8

PRODUCT OUTLOOK

INSIDE PRODUCT OUTLOOK

77 **Compaq Deskpro 386/33**
No rehash of the 25-MHz model, Compaq's 33-MHz machine is designed from the ground up to simplify the biggest computing jobs.

77 **Tektronix Phaser CP**
Create full-color images and transparencies in less than 50 seconds with Tektronix's PostScript-compatible color printing system.

78 **Dolch P.A.C. 386/25**
Dolch's no-compromise 25-MHz portable boasts desktop-strength memory, disk speed, video, and expandability.

80 **HP ScanJet Plus**
For capturing tricky images, HP's 8-bit scanner delivers 256 shades of gray at a price scarcely higher than its 4-bit predecessor's.

80 **Picture Publisher**
A retouching package with darkroom-style image editing techniques helps you produce finished images the first time round.

82 **Ricoh PC Laser 6000/EX, PC Laser 15/EX**
Moving from document processing to desktop publishing? Ricoh's open-architecture laser printers let you pick the controller that fits your life-style without having to buy another printer.

84 **Wysesystem 386 Model 3225**
When Wyse's multitalented 386 upgradable begins to seem too slow at 25 MHz, plug in a new CPU card and upshift to 33.

86 **Fax/Phone Switch II**
No dedicated phone line needed with this fully automatic unit: It runs voice, modem, and fax off a single line.

86 **NEC Silentwriter LC 890XL**
NEC's new laser printer hides an Atlas controller from Adobe Systems that blows the top off the speed limit for multiuser graphics applications.

88 **DataSaver 600**
Brawn without bulk: Cuesta Systems' standby-power unit gives data and hardware full-strength protection without consuming valuable desk real estate.

UPDATE

88 **OmniPage 2.0**
Caere's software-only page recognition system is a touch slower than the card-based version, but it's a lot cheaper and more versatile, and you won't lose a slot.

90 **Reflex 2.0**
A friendly graphic interface, multiple hot-linked data views, and color mark Borland's substantial upgrade of its popular flat-file manager.

The Deskpro 386/33 is 32 percent faster than 25-MHz models, has two more expansion slots, and holds two 650MB hard drives.

Compaq Deskpro 386/33

The Deskpro 386/33: A 33 MHz Made From Scratch

The advent of the 33-MHz 386 computer was so predictable that many PC makers designed their 25-MHz models so that they could just pop in a 33-MHz processor and a few PALs later on. COMDEX Spring was awash in these instant 33s, but the Compaq brand name was noticeably absent. While Compaq generally prides itself on being first with PC innovations, it decided to make the Deskpro 386/33 from scratch rather than reheat its 25-MHz desktop. The result is a far more powerful PC, one that could turn your biggest computing job into a cakewalk.

To begin with, the Deskpro 386/33's Intel 82385 cache controller copies frequently requested data into 64K of 25ns cache (twice the size of previous models) so that you don't lose any of the 32 percent speed advantage a 33-MHz processor has over its 25-MHz counterpart. You also can kick the 386/33 into overdrive for graphics and scientific applications; it has separate sockets so that you can use both the Intel 80387 math coprocessor and the even-faster Weitek 3167.

The Deskpro 386/33 ships with 2MB of 80ns interleaved memory on a 32-bit memory board that is expandable to 16MB, as much as OS/2 can address. It is interleaved so that two 4K memory pages can be addressed simultaneously, giving the new machine a hit rate of 98 percent. And Compaq has added some of the largest, fastest hard drives available and more places to put them.

There's room for three third-height devices fronting the machine's newly styled cabinet and two in the back. But if your application is really a storage hog, you could fill those two drive bays with a single 650MB monster with an average access time of 18ms and a 1:1 interleave ESDI controller whose data transfer rate is 15 mbps, about 50 percent faster than most drives operate. You can fit another of these devices up front under the floppy drive for a belt-busting 1.3GB worth of internal storage. The other hard drive option is an equally fast 320MB ESDI drive. A new version of Compaq's Fixed Disk Expansion Unit will take two more 650MB drives for a total memory potential of 2.6GB.

Normally, the Deskpro 386/33 offers six 8/16-bit and one 8-bit Industry Standard Architecture I/O slots. A floppy/hard disk controller is built into the motherboard, as is a VGA display controller, saving you two slots over prior models. But if you opt for one of the ESDI drives, you'll have to sacrifice an 8/16-bit slot. A 5¼-inch 1.2MB floppy is standard, as are serial, parallel, and mouse ports.

The Deskpro 386/33 comes three ways: The floppy-only Model 84 will be around $10,500, the Model 320 with a 320MB hard drive will go for around $15,000, and the Model 650 with the monster drive will sell for around $19,000. A $699 VGA color monitor is extra. Compaq Computer Corp., 20555 SH 249, Houston, TX 77070; 800/231-0900. —*Mike Hogan*

Reader service no. 660

Tektronix Phaser CP

Waxing Poetic About Low-Cost PostScript Color

A PostScript-compatible printer, the Tektronix Phaser CP uses a thermal wax-transfer process to bring you 300-dpi color output.

You're a clothing designer who wants to show your latest creations on paper, in color, before they ever see needle and thread. Or you're an editorial illustrator who needs to give the press operator an idea of how colors should appear on the map you just drew for tomorrow's paper. Do dreams of color lasers with PostScript still dance in your head? The Tektronix Phaser CP color printing system may be the answer to your prayers, and its price is 40 percent below its closest PC competitor's, according to the manufacture

The $12,995 system consists of the 300-dot-per-inch Phaser CP color thermal wax-transfer printer and the Phaser Card, a multiemulation language controller. Compatible with standard bus PCs, the card is the first PostScript-compatible add-in that supports color and monochrome printers. *(see Tektronix, p. 78)*

Dolch P.A.C. 386/25

A Moveable Feast of PC Power

Lately it's all desktop PCs can do to keep ahead of their portable counterparts in the performance race. The introduction of the Dolch P.A.C. 386/25 intensifies the competition.

The 25-MHz, zero-wait-state performance of the 20-pound Dolch makes it one of the fleetest portables around. And when you're on the road far from your support structure, you'll travel assured that your portable computer is packing all the memory, disk speed, video, and expandability that it needs.

If, as with most 386 users, your applications are as disk-intensive as they are processor-intensive, you'll appreciate the addition of a 64K disk cache, just one of several significant improvements over Dolch's similar 20-MHz offering.

With the help of a proprietary look-ahead caching scheme, Dolch claims, typical applications access the 19ms 40MB hard disk at a blazing 12ms. Anticipating your next read request, the cache buffer manager reads data adjacent to your last read and stores it in cache memory, whence it can be retrieved much more quickly than from disk.

Dolch's electroluminescent, 640-by-400-pixel flat display has the kind of solid-state dependability you need when stowing it in airline overhead luggage racks. And you can see the display even in sunlight and from odd angles that would defeat LCDs.

The 20-pound Dolch P.A.C. 386/25 lets you take 25-MHz, zero-wait-state performance on the road with the help of a 64K disk cache. The unit is backed by a 19ms 40MB hard drive with its own proprietary cache scheme for optimum speed.

It doesn't run off batteries, and the cabinet measures only 16 by 9½ by 8 inches, but the standard configuration includes three 8/16-bit and three 8-bit expansion slots. Even if you install serial and parallel ports, floppy and hard disk drives, and an external color monitor, two 8/16-bit and one 8-bit slot remain unfilled. If you need more, Dolch offers a snap-on expansion chassis with three 16-bit slots, a power supply, and a fan.

You get a generous 4MB of standard RAM, four times the amount in the older 20-MHz model, and you can boost that to a maximum of 8MB without leaving the motherboard.

The base price for the 25-MHz portable is $9495, including a hard drive, a 1.2MB floppy drive, and a SCSI input/output port. Dolch Computer Systems, 2029 O'Toole Ave., San Jose, CA 95131; 800/538-7506, 800/223-2077 California, 408/435-1881. —*Mark Henricks*

Reader service no. 662

Tektronix

(continued from p. 77)

If you happen to own a Tektronix 4693D or DX thermal color printer, you can buy just the card for $6995 and get PostScript compatibility as well as access to Hewlett-Packard plotters, via the HPGL language.

The Phaser CP delivers an 8½-by-11-inch image on 8½-by-14-inch paper or transparency in less than 15 seconds for monochrome and in under 50 seconds with three-pass color. Unless you can afford to keep all that color to yourself, you'll probably be sharing this system. No problem, the Phaser CP is right at home with network servers.

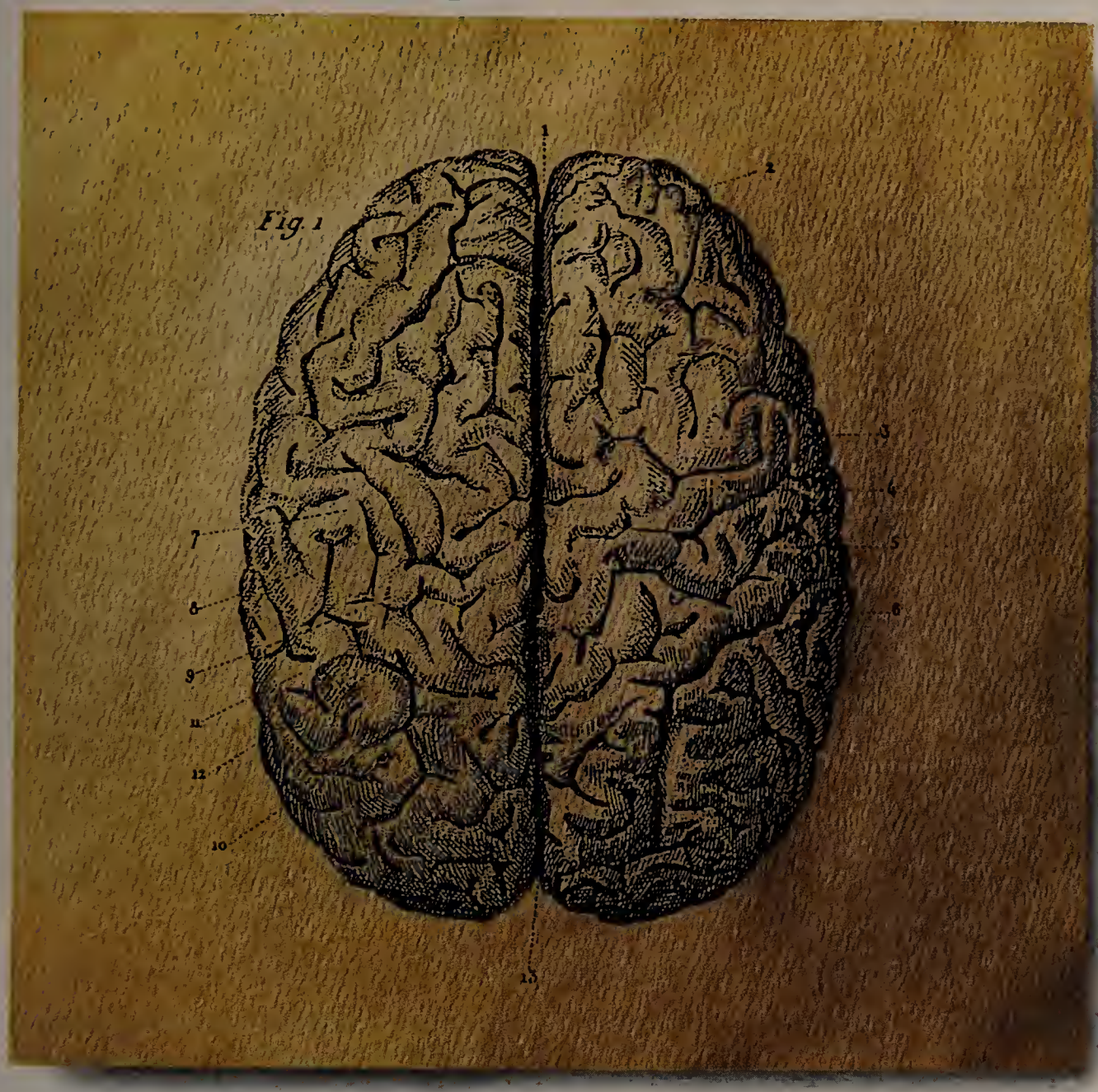
Based on the Motorola 68020 processor, the Phaser Card comes with 8MB of RAM, which can be augmented with 3MB for an additional $1500. The color coprocessor handles color renderings as speedily as monochromes, with a throughput capacity of 6 million pixels per second. You can configure the card to accept data from parallel or serial ports.

Wondering if there's any software sophisticated enough to handle all this ability? Programs that support both color and monochrome PostScript include *PageMaker*, *Harvard Graphics*, *Micrografx Designer*, *AutoCAD*, *AutoShade*, *Microsoft Excel*, *GEM Artline*, and Zenographics's *Pixie*.

Phaser CP comes with 35 standard typefaces licensed from Linotype and International Typeface; outline definitions were digitized by URW GmbH. Additionally, type 3 downloadable fonts without intelligent scaling are supported, and Tektronix provides access to commercial font libraries. Tektronix Inc., Graphics Printing and Imaging Division, P.O. Box 1000, Wilsonville, OR 97070; 503/685-3585, 800/225-5434. —*Glenn Grant*

Reader service no. 661

Now QuickPascal makes this software go even faster.



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HP ScanJet Plus

More Than a Touch of Gray

Pictures aren't always worth a thousand words. Scanning low-quality reproductions of illustrations and photos into a document can work against your message. That's when you find yourself on the horns of the inevitable price/performance dilemma.

Inexpensive 4-bit scanners offer only 16 levels of gray, which leaves some images harsh and unnatural. You can get 256 levels of gray—not just more than enough to produce natural-looking images but more than the human eye can distinguish—from 8-bit scanners. But you can't miss noticing the latter's 50 percent higher prices.

That's where the new flatbed Hewlett-Packard ScanJet Plus desktop scanner really starts looking good. It gives you 8-bit scanning with 256 shades of gray but costs only slightly more than its 4-bit predecessor, the ScanJet.

Considering that each square inch of an image scanned at 256 gray shades and 300-dpi resolution occupies 90K of storage, you may hesitate to flex the machine's muscle—until you must read in images that are too light, too dark, or printed in color.

The ScanJet Plus's controls allow you to increase or decrease contrast infinitely, compared with the three-position switch on the earlier scanner, and a new dial enables you to lighten or darken the whole image. The ScanJet Plus is smaller than its predecessor, weighs half as much, and has fewer parts.

One of the nicest additions is the Plus's feature-rich software bundle. HP's *Scanning Gallery* lets you size images interactively without having to rescan if you find that the shape you've cropped doesn't fit the space in your document. Files may be converted to TIF, *Microsoft Paint*, *PC Paintbrush*, *GEM*, or Encapsulated PostScript format for importing into desktop published or word processed documents.

When it comes time to convert those files to hard copy, you won't need a special output device. The HP ScanJet Plus lets you adjust output to the resolution of nearly any laser printer, typesetter, or other printing device, from 12 dpi to 1500 dpi in 1-dot increments.

The flatbed ScanJet Plus desktop scanner offers 8-bit scanning with 256 gray shades for only slightly more than 4-bit scanners.

The HP ScanJet Plus retails for $2190, including software for both industry-standard and IBM Micro Channel PCs. The IBM PS/2 Model 30 requires a media adaption kit for $68. An optional 8½-by-14-inch automatic document feeder costs $595, and *ReadRight* optical character recognition (OCR) software for scanning text is $595. Hewlett-Packard, Customer Information Center, 19310 Pruneridge Ave., Cupertino, CA 95014; 800/752-0900. —*Mark Henricks*

Reader service no. 663

Picture Publisher

Set Up a Darkroom on Your PC

Even in the exacting world of desktop publishing, what you see isn't always what you get when it comes to images. Variations in monitors, printers, and on-board memory force even the most proficient user to make multiple, time-consuming drafts to obtain the desired paper output. *Picture Publisher* promises to bring it all into focus for you the first time.

Picture Publisher is a complete retouching package that, for $595, gives you darkroom-style image editing techniques previously available only on high-end digital systems or from Macintosh packages like *Image Studio* and *Digital Darkroom*. *Picture Publisher* also strives for first-time final output, thus saving you time, paper, toner, and grief.

The ace up *Picture Publisher*'s sleeve is a nifty calibration trick. You compare a sample grayscale printout to the image on the screen and tweak the program until they match; then you are assured of equal calibration for each darkroom session.

Images can be scanned into the program, captured on still or taped video with the appropriate video conversion board, or imported as TIFF files. Once the image is captured, you can modify it using such common paint program functions as rotating, changing positive to negative and vice versa, adding patterns, and replicating. But whereas most programs make it difficult to *(see Picture Publisher, p. 82)*

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Circle 173 on reader service card

Picture Publisher

(continued from p. 80)

adjust contrast on anything less than the entire image, *Picture Publisher* lets you zero in on specific areas for infinite control of highlights, midtones, and shadows.

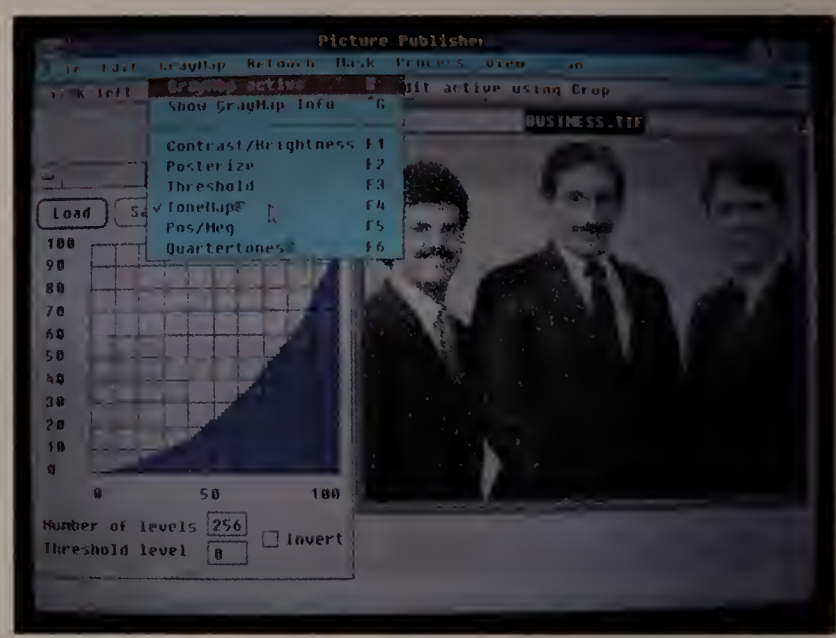
You also can retouch images, change resolution in pixels per inch, sharpen edge details, remove blemishes, create line art, burn and dodge areas as you would with a darkroom enlarger, and "posterize" images to achieve a mottled effect. Spraying, tinting, and smoothing functions also are provided. Photos can be cropped, scaled, and pasted to or from the *Windows* clipboard.

Picture Publisher offers one immediate advantage over Mac programs: Image size isn't limited by memory but by space on your hard disk (a minimum 20MB is recommended). The package exploits your hard disk for virtual memory storage, so you can edit images of nearly any size. Menus and function keys further speed the editing process, although most activities are performed with the mouse.

Windows can't display more than 64 shades of gray, but VGA monitors can. *Picture Publisher* lets you see all or part of any image and manipulate up to 256 shades of gray for a more accurate representation of continuous-tone photographs and a better overall view of the entire image.

Images generated by *Picture Publisher* can be exported to programs such as *Ventura Publisher*, then sent to your printer for hard copy or handed over to a service bureau for final film. The program requires 640K, *Microsoft Windows 2.03* or a later version, DOS 2.0 or a later version, a VGA card, an analog monitor, and a Microsoft-compatible mouse. Astral Development Corp., Londonderry Square #112, Londonderry, NH 03053; 603/432-6800. —*Glenn Grant*

Reader service no. 664



Picture Publisher uses the Microsoft Windows environment to give you easy access to darkroom-style editing techniques such as burning and dodging, or modifying resolution in pixels per inch.

Ricoh PC Laser 6000/EX, PC Laser 15/EX

Print Engines to Drive Down an Open Road

Savvy shoppers know that the purchase of a laser printer is only the first installment of a long-term investment in memory, a particular family of resident fonts and emulations, and a page description language. And if your printing habits change from, say, heavy document processing to desktop publishing, it can mean hauling the printer back to the dealer for an upgrade or even purchasing a brand-new box. Ricoh has joined forces with a host of third-party vendors to create a laser printer line that offers a wide variety of standard features and easy upgrading.

First among the Ricoh Open Architecture Printers (ROAP) are the 6-page-per-minute PC Laser 6000/EX and the 15-ppm PC Laser 15/EX, both externally controlled laser printers. They connect via an external video interface to a controller card occupying a single slot in your PC. The ROAP design lets the controller process text and graphics images at the PC bus speed and send them directly to the printer. This eliminates the performance bottleneck that normally occurs when the PC is forced to send imaging information through a serial or parallel connector to the printer's controller for processing. ROAP controllers can also share on-board RAM as expanded or extended memory and house additional built-in features such as a modem or a fax device.

(see Ricoh, p. 84)

Ricoh's 6-ppm PC Laser 6000/EX and 15-ppm PC Laser 15/EX provide you with basic printing engines. You choose the third-party controller that best serves your printing needs, be it one with HP LaserJet or PostScript emulation.

You know exactly what your company wants in a color printer.

Wysesystem 386 Model 3225

Running With the Fast Crowd

The field of 80386-based PCs is growing fast, and with 33-MHz 386s beginning to move up on the outside, system manufacturers are frantically jockeying for position. Wyse Technology has maneuvered into the middle of the pack with a high-end 25-MHz pacer that sports an easily upgradable CPU, enabling you to switch mounts when the 33-MHz stampede finally overtakes you.

The newest addition to Wyse's stable of 286- and 386-based upgradables, the Wysesystem 386 Model 3225 is augmented by 64K of 25ns static column cache memory, giving it the stamina for high-end chores such as file serving, computer-aided design and engineering, financial modeling, and multiuser applications.

At the heart of the Model 3225 is a passive backplane design with a board-mounted CPU. You'll be able to upgrade in the future just by plugging in a new CPU card. The CPU, the proprietary cache controller, and 4MB of zero-wait-state memory modules (expandable to 16MB) reside on three boards connected by a dedicated 32-bit top plane that lets the trio operate at processor speeds. A floppy disk controller and a serial/parallel card occupy two slots on an AT-compatible bus, leaving two 8-bit and four 8/16-bit slots on that bus for more add-ins.

With the Wysesystem 386 Model 3225's passive backplane design, you can get a 25-MHz zero-wait-state CPU today and upgrade to a 33-MHz CPU card in the future.

Several performance-enhancing extras should also help the Wysesystem 386 go the distance. At system start-up, shadow ROM copies the Phoenix BIOS and the VGA BIOS into faster system RAM. An ESDI controller with 1:1 interleave and a 10-mbps data transfer rate provides optimum speed for your storage device. For hard-core number crunching, the Wysesystem 386 supports both the 25-MHz Intel 80387 coprocessor and the 25-MHz Weitek 3167 coprocessor.

Among the Model 3225's standard features is a 16-character LCD system status display that indicates date, time, processor speed, disk access, and other performance information. A 101-key keyboard, a 220-watt power supply, and room for five half-height 5¼-inch storage devices round out the basic offerings. EMS 4.0 support is built in. Bundled software includes Wyse enhanced DOS 3.3 and a disk caching utility.

The Wysesystem 386 comes three ways. The Model 3225-01 includes 4MB of memory, a 64K cache, and a 1.2MB floppy disk drive for $8599. The Model 3225-150T adds a 150MB hard drive with 17ms access time for $11,199. The 3225-300T packs a 17ms 300MB drive for $12,699. Monitors and graphics adapters are optional. Wyse Technology, 3471 N. First St., San Jose, CA 95134; 800/438-9973. —*Wes Nihei*

Reader service no. 668

Ricoh

(continued from p. 82)

Ricoh hopes that ROAP specs catch on as an industry standard and has lined up an impressive list of vendors to get things started. At press time, more than a dozen manufacturers offered controllers for the PC Laser 6000/EX and the 15/EX: Advanced Vision Research, Bell & Howell, Conographic, Destiny Technology, Eicon Technology, Everex, Hanzon Data, Intel, Laser Graphics, LaserMaster, PCPI, RIPS, Rastek, Tall Tree Systems, and Western Digital.

The controllers cover a broad range of price and functionality. For example, Hanzon's PC Vista board provides 512K of memory, HP LaserJet emulation, printer sharing, and ethernet LAN connectivity for $499. Conographic's Conodesk 6000 offers 2.5MB, the Conscript PostScript-compatible page description language, and 35 fonts for $2695.

Both ROAP printers offer standard paper handling. The $1895 6000/EX comes with a standard 150-sheet paper tray; an optional 250-sheet tray goes for $499. The $4995 15/EX is a heavy-duty paper mover, featuring dual 250-sheet paper trays. Both printers use a straight-through paper path to accommodate envelopes, labels, transparencies, and European paper sizes. Ricoh, 3001 Orchard Pkwy., San Jose, CA 95134; 408/432-8800. —*Wes Nihei*

Reader service no. 665

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Circle 114 on reader service card

Fax/Phone Switch II

Unjumble Fax, Voice, and Data Transmissions

This is the age of low-cost communications devices that offer instant connections between offices and home offices around the world. But after trying to juggle voice calls, fax, and modem transmissions on the same phone line, you may be driven to spring for an expensive dedicated data line. One alternative is Fax/Phone Switch II.

With this modem-size unit hidden on your phone line, you can run voice, modem, and facsimile off a single line without mixing them up. The best thing about the Fax/Phone Switch II is that it's automatic, requiring no toggling once installed. No buttons or switches mar its gray cabinet; even the internal surge suppressor resets by itself.

The switch incorporates patented sound-recognition algorithms to determine whether an incoming call is voice, fax, or modem; it then connects the appropriate device to the phone line. The device doesn't rely on counting the number of rings to screen incoming calls as some switches do. Instead, it puts the burden on callers, with a digitized voice prompting them to say "telephone" to route the call to the phone. For modem or fax transmissions, the accompanying tone signals the switch to bring the appropriate device on line.

At a suggested retail price of $179, the Fax/Phone Switch II can pay for itself in dedicated line charges in a matter of months. It works with answering machines, PBXs, key phone systems, and single-line phone hookups. The manufacturer says the unit supports all modem and fax protocols.

The switch doesn't allow you to talk on the phone while using the modem or fax. Nor can you record an incoming message or screen junk fax. You must connect the switch as the first device on the incoming line, or anyone picking up a telephone connected upstream from the Fax/Phone Switch II will interrupt data transmissions on that line.

If you can't connect the switch upstream from everything, you'll have to install a $50 Line Manager accessory on each extension. Then anyone who picks up the phone during data transmission will hear a busy tone, and transmission will continue unimpeded. Electronic Speech Systems Inc., 1900 Powell St. #205, Emeryville, CA 94608; 415/547-2755. —*Mark Henricks*

Reader service no. 666

The modem-sized Fax/Phone Switch II automatically switches voice, modem, and facsimile transmissions coming in on a single line to the right device.

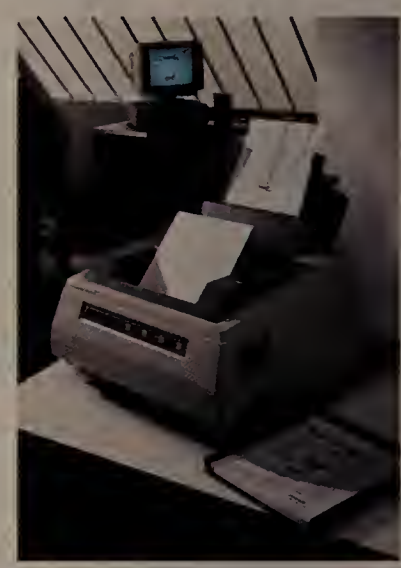
NEC Silentwriter LC 890XL

A Network Printing Power Play

Pages per minute isn't the only cap on printer throughput. If your printer serves a dozen network users in a graphics-intensive environment, the speed of the printer controller and its available memory can cause significant bottlenecks.

The Silentwriter LC 890XL laser printer from NEC Information Systems pops the top on throughput for multiuser graphics applications with an Atlas controller from Adobe Systems. The Motorola 68020–based Atlas gives the LC 890XL three times the processing speed of NEC's LC 890 PostScript printer, which was built around the 68000 chip, NEC says.

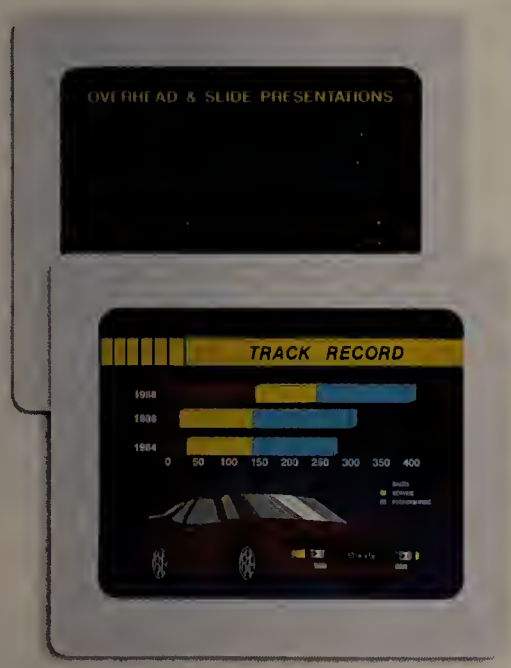
So despite the same 8-ppm printing speed as the LC 890, the new system generates a page of graphics in a fraction of the time. That speed can help keep your group working when several members are preparing a common document, or keep your hair unmussed when you're printing a page thick with fonts. (In text-intensive applications, in which processing speed is less important, the 890XL performs about the same as the 890.)

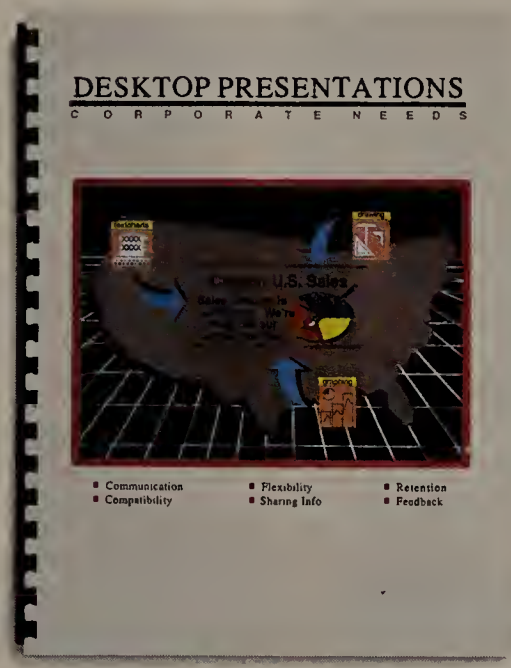


NEC's Silentwriter LC 890XL laser printer uses an Atlas controller from Adobe Systems with a fast processor and extra memory to boost graphic throughput for LAN work groups.

The LC 890XL packs more memory than the LC 890—shipping with 4MB of main memory, expandable to 8MB, compared to a nonexpandable *(see NEC, p. 88)*

Easy To Get With The Program.





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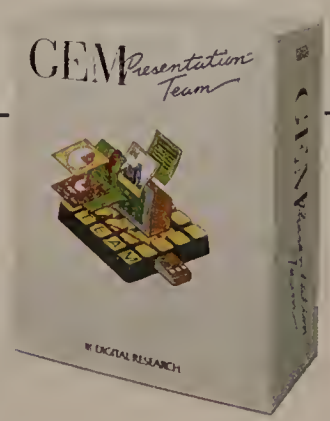

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Circle 266 on reader service card

DataSaver 600

Low-Profile Power Protection for Critical Missions

Cuesta has put 600 watts/75V of backup power into its DataSaver 600's slimline cabinet so that in the event of a blackout, you have 15 to 18 minutes to safely shut down your computer system.

Buy a standby power unit, and you've bought data insurance, hardware protection, and peace of mind. But in most cases, you've also bought a bulky, weighty box. Some newer uninterruptible power supplies (UPSs) feature a slimmer, more functional design but can protect only a few hundred watts of equipment for a relatively short time.

The $985 DataSaver 600 from Cuesta Systems cuts the bulk factor down to size and ups the power factor to 600 watts/75V. That boost should give you 15 to 18 minutes to safely shut down a 300- to 600-watt system. The unit is meant for users of mission-critical applications such as accounting, for CAD/CAM workstations, and for network file servers in engineering, architectural, and medical offices.

At a trim 2.3 inches high, 17.75 inches long, and 15 inches wide, the DataSaver 600 looks more like a power-director device. It fits neatly between your monitor and computer and even provides a keyboard light that helps you see what you're doing if an outage blacks out the room.

A well-thought-out front panel houses the on/off switch, often at the rear of other UPSs; an illuminated bar graph that shows you approximately how much power is left after the juice stops, in 60-watt segments; a charge light that indicates when the unit is replenishing its sealed batteries; and a mode light that shines green when you're on AC power, red on DC (backup). An alarm sounds when the unit switches to DC, which takes about 2 milliseconds. The lead-acid gel cell batteries can hold a full charge for 60 to 90 days; external lead-acid batteries can be connected to obtain more backup time but not more watts or amps.

No UPS is lightweight, but the *DataSaver 600* tips the scales at 38.5 pounds, fairly low for a unit with its capacity. The unit has five AC outlets in back, all with spike and transient protection and noise filtering; three provide uninterruptible power. A circuit breaker protects against overload. Cuesta Systems Corp., 3440 Roberto Ct., San Luis Obispo, CA 93401; 805/541-4160. —*Glenn Grant*

Reader service no. 669

NEC

(continued from p. 86)

3MB on the LC 890. The added memory increases processing speed, and an optional 20MB hard drive helps in other ways. Unavailable on the older NEC, the hard drive saves you more than a few milliseconds by storing fancy fonts and overlays rather than forcing you to create and download them each time. Another plus: You can turn off the system at day's end without losing graphics stored on disk.

NEC's PostScript emulation is licensed from Adobe and includes helpful wrinkles such as support for the printer's front-mounted control panel, with menus to guide you through setup. You get 35 resident fonts and can also download and use Adobe fonts.

The LC 890XL is priced at $6995 and the optional 20MB disk at $995. Memory upgrades of 4MB cost $1995. NEC Information Systems Inc., 1414 Massachusetts Ave., Boxborough, MA 01719; 508/264-8000. —*Mark Henricks*

Reader service no. 667

UPDATE

OmniPage 2.0

Soft Solution for Page Recognition

Even as you sit peacefully reading this magazine, a wave of paper is building up, preparing to crash onto your desk. Much of it will wash right into your round file. But amid the flood are bits of information that could prove critical some day—if only you had a quick way to capture and store them.

That's the promise of optical character recognition (OCR) technology: Zip that paper through a scanner and store it in compact and convenient

(see OmniPage, p. 90)

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OmniPage

(continued from p. 88)

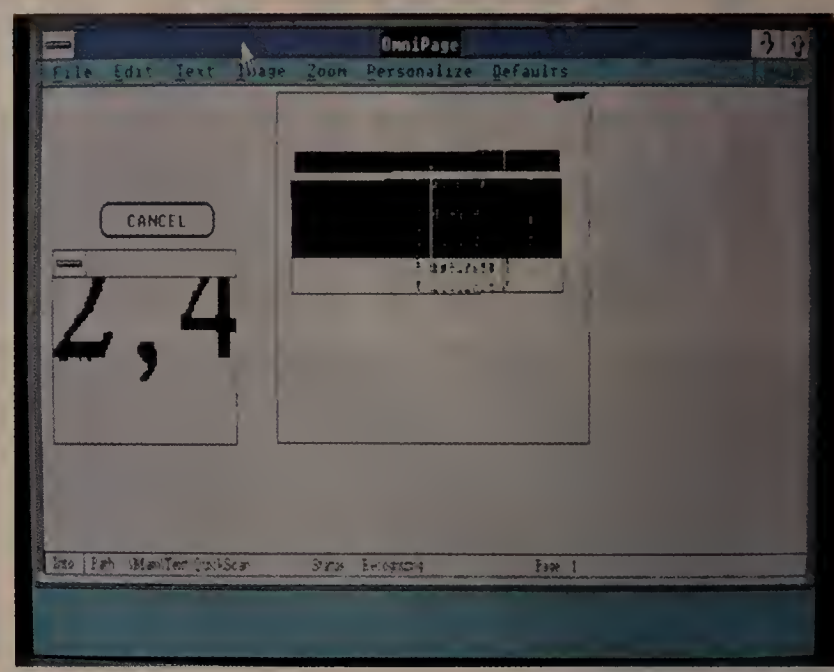
electronic form. But despite scanner advances, OCR remains a dream deferred. Products either have required costly specialized coprocessing hardware or just didn't cut the mustard.

Caere Corporation promises to topple these barriers with *OmniPage 2.0*, an $895 software-only version of its card-based page-recognition product. The *Windows*-based *OmniPage 2.0* requires a powerful PC platform—specifically, an 80386 machine with 4MB of memory. But it recognizes text from almost all scanned documents, regardless of the number of columns, kind of fonts, use of bold or italic text, and mix of headlines, graphics, and captions. You then can save the text in one of 16 word processing formats or in a *1-2-3*, *Excel*, or *dBASE* file.

Throughput will be a tad slower than with Caere's $2495 OmniPage coprocessor board, which speeds through 40 to 115 characters per second. But *OmniPage 2.0* incorporates several advances, such as recognizing pages in landscape mode, which aids the scanning of spreadsheet data and newspapers. The interface has received a face-lift—*OmniPage* can save graphics portions of a page separately and lets you see results without leaving the application. It can run in the background, and you can edit both graphics and text.

OmniPage requires the aforementioned 386 with 4MB of memory, DOS 3.1 or a later version, and a hard disk with at least 5MB of space free. Caere will continue to sell the OmniPage coprocessing board, with the new software, for AT machines at $2495. Software upgrades for owners of the OmniPage board cost $150. Caere Corp., 100 Cooper Ct., Los Gatos, CA 95030; 408/395-7000. —*Eric Bender*

Reader service no. 670



OmniPage 2.0, an $895 software-only version of Caere's $2495 scanner board, recognizes text from almost all documents, regardless of the number of columns, the type of fonts, the use of bold or italic text, or the mix of headlines, graphics, and captions.

STEVE KURTZ

Reflex 2.0

Colorful Views

No one can accuse Borland of messing with a winner. It released *Reflex* in 1985, then left the package to fend for itself for three years. But an easy-to-use graphic interface and multiple on-screen hot-linked views of data show that the time of benign neglect is over.

Version 2.0 of the popular flat-file manager is still resolutely nonrelational and lacks a programming language. But the sweep of the other changes makes *2.0* well worth the wait. The handiest change is also the most visible. You now enjoy up to five windowed views: list, form, graph, mail merge, and cross-tab. You can even opt for multiple views of the same data base, although not two views of the same kind. And at long last, *Reflex* struts its stuff in color.

Reflex 1.0 suffers from some annoying limitations: You can't produce a report or print a graph or mailing labels from your data base file. But in version 2.0, you can access the report view from within a file—like any other view—and graph printing is an integral part of the graph view. *Reflex* formats mailing labels automatically and prints them one, two, or three across—more, if your printer allows it.

Text handling is greatly enhanced by a built-in mini–word processor that can edit fields longer than 254 characters and create memo fields of up to 8000 characters. The new mail merge view is an electronic notepad on which you compose form letters and pick fields. Thanks to a new disk-based architecture, *Reflex* files are no longer limited by available memory, so you can create data base files as large as 32MB, with up to 65,000 records.

Finally, *Reflex* is on clear speaking terms with the outside world. Version 2.0 reads and writes a wide variety of file formats, naturally including *Reflex 1.x*, *Quattro*, and *Paradox*, as well as *1-2-3*, *dBASE*, and DIF. The $249.95 product requires a hard disk, DOS 2.0 or a later version, and 512K of memory. Upgrades are $75. Borland Int'l, 1800 Green Hills Rd., Scotts Valley, CA 95066-0001; 408/438-8400. —*William Rodarmor*

Reader service no. 671

For more information about any product, contact the manufacturer or circle the number on the reader service card.

Glenn Grant is a frequent PC World *contributor, Mark Henricks is* PC World*'s Dallas-based contributing editor, and Wes Nihei is a* PC World *assistant editor.* ●

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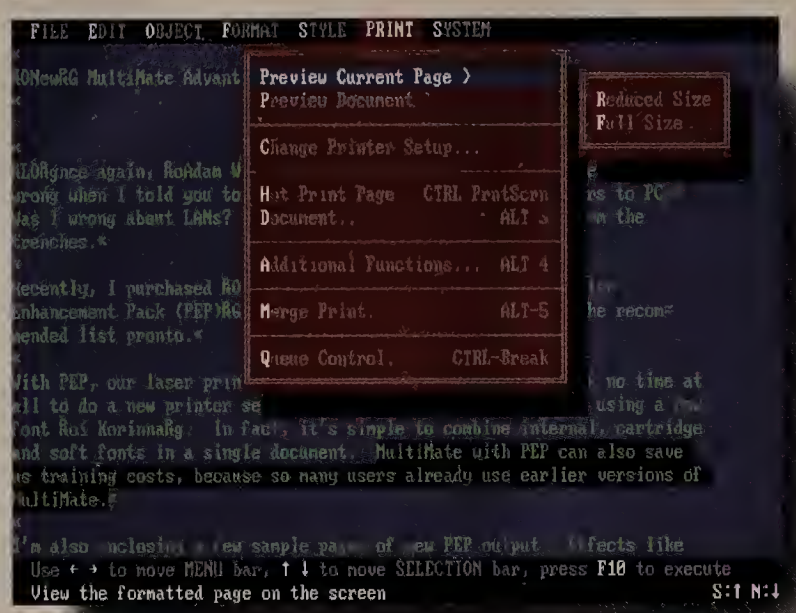
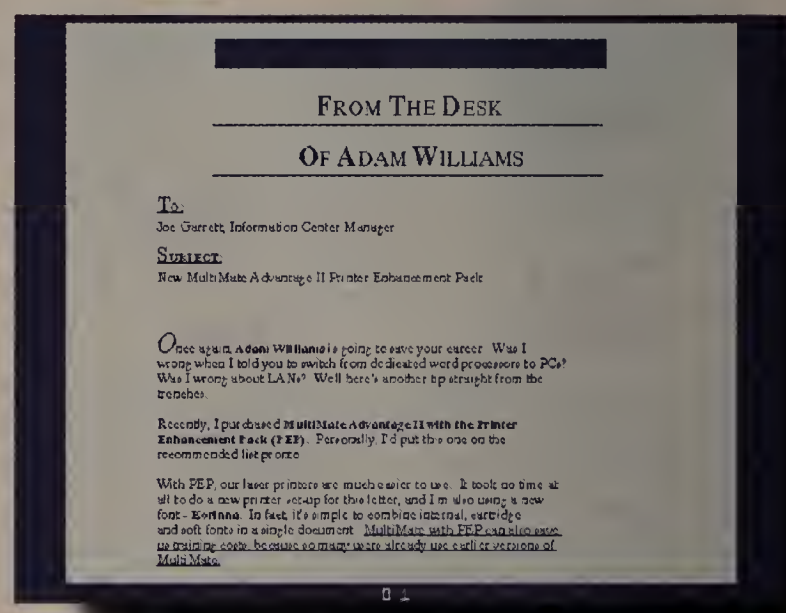


Complete pull-down menus with lightbar select make the easiest word processor even easier.



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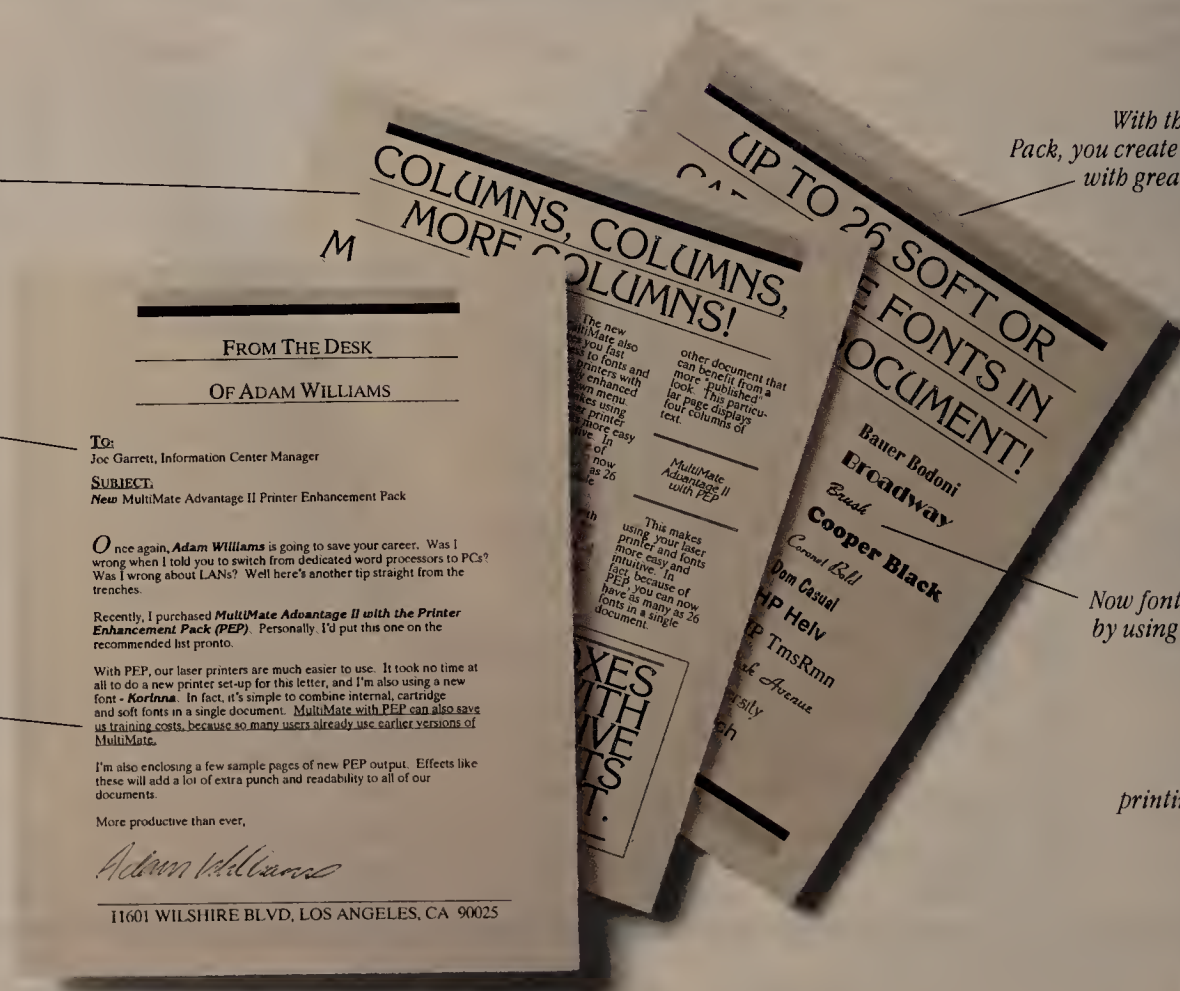

Your finished output matches what you checked on-screen in the WYSIWYG Preview mode.

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PostScript Printers—Right for the Office

For attention-getting memos and reports, nothing beats a versatile PostScript printer.

PC World tests seven new machines and finds lower prices and higher performance than ever before.

Daniel Miles Kehoe

For many business documents, monospaced Courier plus a handful of proportional typefaces in a couple of point sizes just doesn't cut it anymore. That's why PostScript printers are beginning to usurp LaserJets as the business printers of choice. Their key advantage is abundant, internal, scalable typefaces—faces you can resize at will. With the LaserJet and its compatibles, you must choose fonts of fixed point sizes—from the meager selection of built-in fonts, from expensive font cartridges, or from hard-to-install soft fonts on disks.

The latest round of PostScript printers holds new attractions for business users. The PostScript interpreter still slows printing on pages that combine graphics and multiple fonts, but thanks to processor-laden controllers, overall performance is approaching the LaserJet's. Moreover, although the average PostScript printer's base price is still about twice that of a LaserJet Series II, loading the HP unit with a comparable amount of typefaces and memory makes the price difference relatively trivial.

In this article, we examine seven new PostScript printers ranging from $4199 to $7995 in price: Apple's LaserWriter IINTX, Dataproducts' LZR 1260, GCC Technologies' Business Laser Printer, IBM's Personal Page Printer II, QMS's PS 1500, Qume's Crystal-Print Publisher, and Ricoh's PC Laser 6000/PS.

National Software Testing Laboratories (NSTL) ran the printers through a battery of speed and PostScript compatibility benchmarks. A printer's page-per-minute (ppm) rating refers to maximum print engine speed; NSTL's tests indicate that actual print throughput is a tad slower for text and much slower for complex pages. Print quality (sharpness of lines and type, and tonal range) was evaluated by an NSTL review panel. Finally, since not all software includes a PostScript driver, NSTL tested LaserJet compatibility—a feature offered by all but three printers in the roundup; testing revealed compatibility problems with every LaserJet emulation.

More business applications than ever before support PostScript, but Murphy's Law guarantees that your favorite package will be an exception. Fortunately, a handy utility called *Trading Post* can alleviate the problem by translating printer output from almost any application into simplified PostScript (see *The Software Shelf, PCW,* March 1989).

Apple LaserWriter IINTX

The pricey $6999 Apple LaserWriter IINTX sets a new standard for PostScript printers. It's surprisingly fast, its print quality is second to none, and it uses the same easy-to-change toner cartridge employed by the HP LaserJet Series II. It even supports an optional 20MB hard disk ($899) to store extra fonts. Its one serious drawback is the lack of a Centronics parallel port, which means you'll need to become more intimate with the MODE command than you might like.

The IINTX uses the highly regarded Canon LBP-SX engine. Despite some ghosting (intermittent fading in large black areas) and a somewhat limited tonal range, this engine delivers the best print quality in the industry, with crisp, well-formed type and sharp lines.

All the printers in this roundup come with at least 2MB of RAM—enough to print a full

The Apple LaserWriter IINTX (far left) offers reliability and superb print quality; Dataproducts' LZR 1260 is fast and designed for heavy use.

PIERRE-YVES GOAVEC

FEATURES EVALUATION

Apple IINTX: Dollar for Dollar, the Best PostScript Printer in Its Class

The Dataproducts LZR 1260 offers the heaviest duty cycle, the QMS-PS 1500 holds the most paper, and the GCC Business Laser has the lowest price—but the Apple LaserWriter IINTX offers the best combination of price, performance, and print quality.

● Yes
○ No
◒ Deficient

	Apple LaserWriter IINTX	Dataproducts LZR 1260	GCC Business Laserprinter	IBM Personal Page Printer II	QMS-PS 1500	Qume CrystalPrint Publisher	Ricoh PC Laser 6000/PS
Standard features							
List price	$6999	$7995	$4199	$4999	$7995	$4499	$4495
Standard RAM (MB)	2	4	2	2	4	3	2
Maximum RAM (MB)	12	4	4	4	4	3	4
Engine	Canon LBP-SX	Toshiba A-739	Ricoh 1060	Ricoh 1060 [1]	Ricoh 4150	Casio LCS-130	Ricoh 1060
Rated speed (ppm)	8	12	6	6	15	6	6
Monthly duty cycle (pages)	5000 [1]	25,000	3000	3000 [1]	15,000	3000	3000
Cost per page (cents)	3.7	2.6	3.6	5.4 [1]	3.8	2.9	3.9
Centronics parallel port	○	●	●	●	●	●	●
Serial port	●	●	●	●	●	●	●
AppleTalk port	●	●	●	●	●	●	●
Internal fonts	35	35	39	43	35	35	35
Accepts Adobe fonts	●	●	●	●	●	○	●
Supports dedicated hard disk	●	●	●	○	●	○	○
Paper handling							
Paper capacity (sheets)	200	250	150	150	500	100	150
Prints legal-size paper	● [2]	●	●	●	● [2]	● [2]	●
Prints envelopes	●	● [2]	●	●	○	○	●
Emulation							
HP LaserJet Plus Series II	◒ [3]	◒ [3]	○	◒ [3]	○	○	◒ [3]
Diablo 630	●	○	○	○	○	○	○
HPGL plotter	○	○	○	○	● [4]	○	○
Dot matrix printers	○	○	○	●	○	○	○

[1] Estimated; manufacturer does not state.
[2] Optional.
[3] HP emulation provided but problematic under certain conditions.
[4] Emulation provided via software.

page of 300-dpi graphics (off-the-shelf 512K LaserJets stumble at ⅓ page). The IINTX comes with 2MB, but desktop publishers who need more memory for unusually large numbers of downloaded fonts can have their dealer upgrade the printer to a huge total of 12MB—the largest capacity of any printer reviewed.

Thanks to its in-board 68020-based controller, the IINTX proves that PostScript isn't just for the idle rich. But its 8-ppm engine is no speedster. NSTL tests show that the IINTX falls in the middle of the pack in both text and complex page printing.

Paper capacity (200 sheets) is a bit low for a busy office, but a variety of large-capacity trays and sheet feeders are available from third parties. Envelope printing is straight-

forward, and LaserJet and Diablo 630 emulation are provided.

You can buy a fully functional PostScript printer for $2800 less than the Apple IINTX, and the lack of a parallel port may be frustrating. Nonetheless, if you can afford the tariff and don't mind fussing with a serial port, this printer offers a winning combination of speed, reliability, and good-looking output.

EXECUTIVE SUMMARY

Apple LaserWriter IINTX

PostScript laser printer

In most respects this is the best PostScript printer you can buy. While it's pricey and lacks a parallel port, its speed, reliability, and excellent print quality make it a highly appealing choice for demanding users.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Paper handling			●	
Emulation		●		
Print quality (text)				●
Print quality (graphics)			●	
Speed				●
Overall value			●	

Reader service no. 701

Dataproducts LZR 1260

Aside from a $7995 price tag (a tie for the most expensive in the roundup), Dataproducts seems to have hit on a formula for PostScript printer success: a fast, 12-ppm Toshiba engine; a blazing Motorola 68020 processor; 35 scalable typefaces; 4MB of RAM; and a very high 25,000-page monthly duty cycle.

In NSTL speed tests, this printer came in second—but tests of print quality were less impressive. While gray shades were well differentiated and fine lines crisp, fat dots of toner blurred the edges of some characters.

In its stock configuration, the LZR 1260 holds 250 sheets of paper, but an optional ($895) multibin sheet feeder adds two more trays for a total of 750 sheets. An optional ($1095) envelope feeder accommodates 50 envelopes.

Ease of use is not the LZR 1260's strong suit. While the control panel offers complete control of the printer, using it is a bit complicated. Moreover, the LZR 1260 sticks you with four separate steps to replace con-

GCC Technologies' low-priced Business Laser Printer produces decent looking pages, but it lacks LaserJet emulation.

EXECUTIVE SUMMARY

Dataproducts LZR 1260

PostScript laser printer

This $7995 printer is the best choice in the high-speed class. Print quality is just adequate, and only LaserJet emulation is offered, but speed, a hefty 25,000-page duty cycle, hard disk support, and 4MB of standard RAM make it a smart buy for a busy office.

	POOR	FAIR	GOOD	EXCELLENT
Standard features				●
Paper handling			●	
Emulation		●		
Print quality (text)		●		
Print quality (graphics)			●	
Speed				●
Overall value			●	

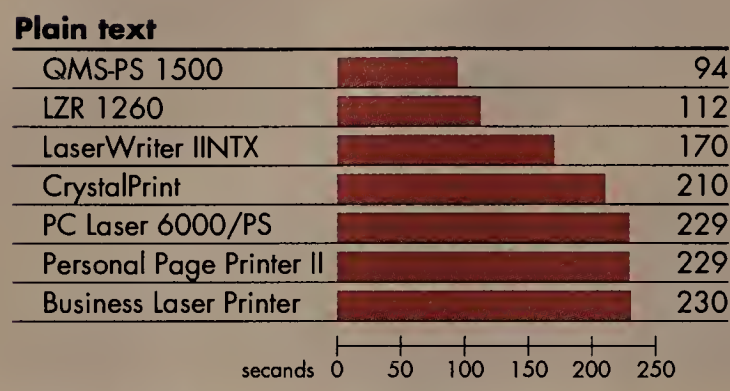
Reader service no. 702

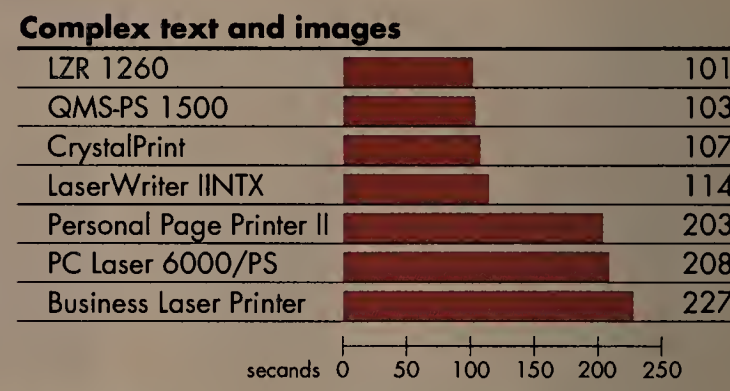
PIERRE-YVES GOAVEC

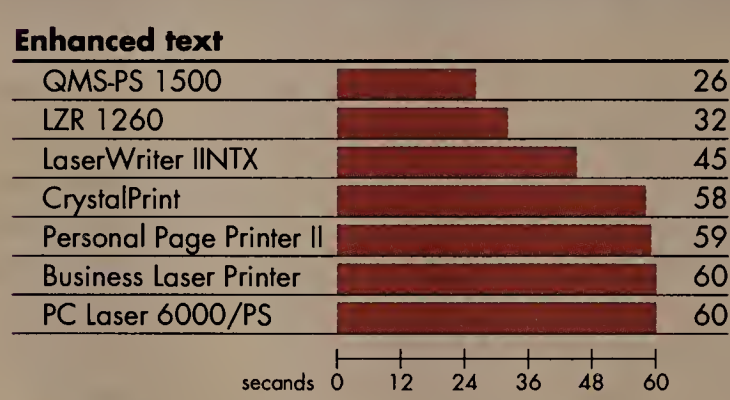
NSTL TEST REPORT

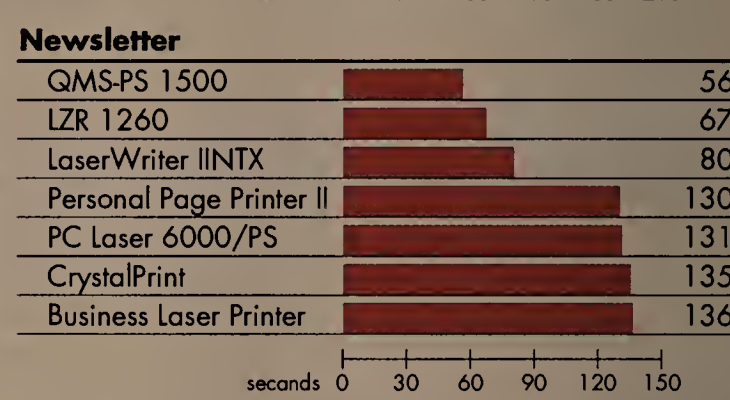
The Best PostScript Printer Isn't the Fastest

The QMS-PS 1500 and Dataproducts LZR 1260 take top honors for speed, but Apple's IINTX, running just behind, delivers much better print quality and easier maintenance.









Methodology
Benchmarks were conducted on a 12-MHz Compaq Deskpro 286 with 1.2MB of RAM. Printers were equipped with at least 2MB of RAM. To eliminate an application's effect on printing time, all output was captured to a RAM disk, then copied to the printer. Data was sent via the parallel port whenever the printer offered parallel input; the Apple IINTX was accessed via its AppleTalk port. Timing began when the command to copy was issued and ended when the last page came to rest in the output tray. Each test was performed three times. Results of the first test, which takes longer (to allow fonts to be initially cached), were excluded; results for the second and third tests were then averaged.

Plain text
Plain text printing was tested using a 21-page text document written entirely in Courier 10 with no enhancements (such as boldface or underlining) and generated in portrait mode with the *WordPerfect* Apple driver. (The QMS printer was tested with the *WordPerfect* QMS driver.)

Enhanced text
Enhanced text printing was tested using a 4-page text document written entirely in Courier 10 but containing superscripts, subscripts, boldface, underlining, italics, and so forth and generated in portrait mode with the *WordPerfect* Apple driver. (The QMS printer was tested with the *WordPerfect* QMS driver.)

Complex text and images
Complex text and images printing was tested using a 1-page *Ventura 2.0* document that included various sizes of Helvetica, a small scanned image, some line drawings, and a bar chart.

Newsletter
Newsletter text and graphics printing was tested using an 8-page *PageMaker 3.0* newsletter that included various sizes of Helvetica, and horizontal bar charts.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

sumables—the least convenient design in the roundup. The only emulation is for the LaserJet.

Despite awkward maintenance and somewhat underwhelming print quality, the LZR 1260 is a good choice for busy offices—at least where bargain price is not a major issue. Users will appreciate the speed and the paper-handling options, while managers will appreciate the heavy duty cycle.

GCC Technologies Business Laser Printer

Although the $4199 GCC Technologies Business Laser Printer is the least expensive of the seven printers reviewed, it comes with 2MB of RAM (expandable to 4MB) and a generous 39 fonts and, like the Apple Laser-

Writer IINTX, supports an optional 20MB hard disk ($779). However, it's the slowest printer in the roundup, and its print quality can be less than terrific. Worse, it holds only 150 sheets of paper, replacing consumables is an inconvenient three-stage process, and there are no emulations at all.

The Business Laser uses the 6-ppm Ricoh 1060 engine, which is capable of producing extremely sharp, tonally balanced pages. Unfortunately, because this engine needs fine-tuning at the factory (or by a qualified technician), Ricoh-based printers don't always deliver optimal print quality. Output from the Business Laser was mixed: Fine lines were sharp, but distinguishing dark gray shades from black was difficult—there is no toner density dial to compensate.

Ricoh rates this engine for a light 3000 pages per month, suggesting that the Business Laser may be most appropriate for small offices, especially where budgets are tight and *all* important software includes a PostScript driver. In light of this machine's slow printing, lack of emulations, and awkward maintenance, managers at larger businesses would be wise to spend a little more for a lot more printer.

EXECUTIVE SUMMARY

GCC Technologies Business Laser Printer

PostScript laser printer

The BLP has the lowest price in the roundup, and while it offers no emulation modes and its duty cycle is light, it boasts good print quality and handles legal sheets and envelopes without accessories. You even get a few extra fonts and hard disk support.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Paper handling			●	
Emulation	●			
Print quality (text)			●	
Print quality (graphics)			●	
Speed		●		
Overall value			●	

Reader service no. 703

IBM's Personal Page Printer II is a respectable machine with 43 scalable fonts—but you'll pay extra for the name.

PIERRE-YVES GOAVEC

IBM Personal Page Printer II

At $4999, IBM's Personal Page Printer II is relatively inexpensive. It includes a generous library of 43 fonts, and emulations for the IBM Proprinter and the LaserJet, and it boasts the three magic letters that many purchasing departments require. However, it's not very fast, ranking among the three slowest printers in the roundup.

In many respects (low paper capacity, light duty cycle, inconvenient replenishment of consumables), the IBM and the GCC Business Laser Printer are virtual clones. They

NSTL BENCHMARK TESTING

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, **NSTL** believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. **NSTL** testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. **NSTL** publishes its test results in *Software Digest Ratings Report*® and *PC Digest*.™ Neither publication accepts advertising. **NSTL** is located in Philadelphia, Pennsylvania.

High speed and a 500-sheet capacity make the QMS-PS 1500 ideal for busy offices—but beware its high price and poor print quality.

PIERRE-YVES GOAVEC

also share the 6-ppm Ricoh 1060 engine, which, as mentioned, requires expert adjustment. Thus, the review unit at NSTL produced excellent output, while the review unit at *PC World* produced graphics that were consistently light and type that was light and occasionally broken.

If your purchasing department is committed to IBM, don't panic; you could do much worse. The Personal Page Printer II offers adequate speed, a fine selection of typefaces, (probably) good print quality, and the IBM reputation. But remember: Both the $4199 Business Laser from GCC and the $4495 PC Laser 6000/PS from Ricoh offer similar performance and features at lower cost.

QMS-PS 1500

At $7995 the QMS-PS 1500 ties for the most expensive printer in the roundup—but it's not without its charms. It's the fastest printer tested, holds a total of 500 sheets, comes with 4MB of RAM (nonexpandable), supports a hard disk, and boasts a healthy 15,000-page duty cycle—making it a tempting choice for large networked offices. But in this case, high-speed output merely means that this machine grinds out dark, smeary pages faster. And it totally lacks the ability to print envelopes.

The PS 1500 is easy to use, thanks to its well-designed control panel—but replenishing consumables is an awkward two-stage process during which it's easy to spill toner or scratch the imaging unit. The only emula-

EXECUTIVE SUMMARY

IBM Personal Page Printer II

PostScript laser printer

Speed, print quality, and paper handling are acceptable, and you get a generous 43 fonts—but the duty cycle is light, and you'll end up paying extra for the famous name. The GCC offers similar performance and features for $800 less.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Paper handling			●	
Emulation		●		
Print quality (text)			●	
Print quality (graphics)			●	
Speed		●		
Overall value		●		

Reader service no. 704

EXECUTIVE SUMMARY

QMS-PS 1500

PostScript laser printer

This is the fastest printer tested, and its 500-sheet paper capacity will be a welcome feature in busy work groups, but disappointing print quality, no envelope ability, no HP emulation, and a very high price make this a less than compelling value.

	POOR	FAIR	GOOD	EXCELLENT
Standard features				●
Paper handling		●		
Emulation		●		
Print quality (text)	●			
Print quality (graphics)			●	
Speed				●
Overall value		●		

Reader service no. 705

tion lets the printer pretend it's an HP plotter.

A Motorola 68020 processor is a big factor in the PS 1500's blazing performance, but speed can't improve the poor print quality of the notorious Ricoh 4150 engine. Dark grays print so densely they're indistinguishable from blacks, and smeared toner along the edges of characters produces shadows. There is no print density control.

Despite speed and high paper capacity and duty cycle, the PS 1500 is overpriced. With all the good buys on the market, why settle for poor print quality, lack of envelope capability, and limited emulations?

Qume CrystalPrint Publisher

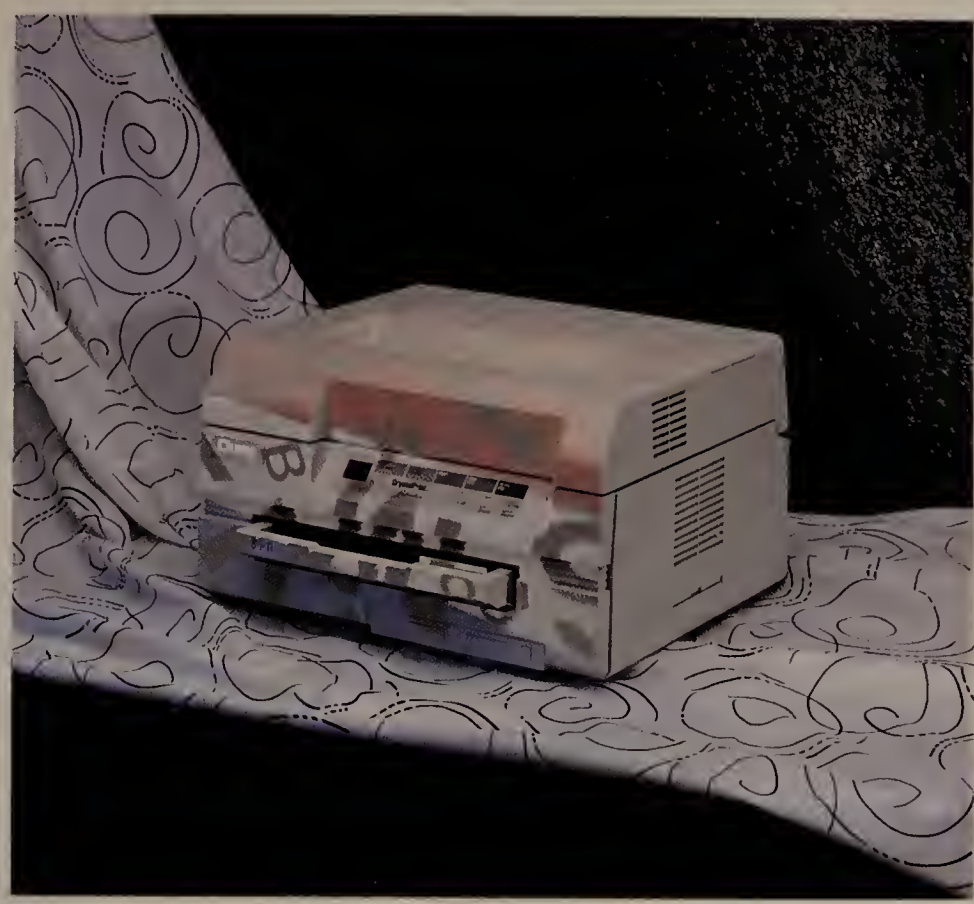
For a printer with a 6-ppm engine, the low-priced $4499 CrystalPrint Publisher is surprisingly fast on some print jobs (although it slows down on others, due to an unusual controller design). Furthermore, the standard 3MB of RAM (nonexpandable) allows plenty of room for downloaded fonts, and the control panel provides easy access to all printer functions. Unfortunately, that's where the good news stops. Print quality leaves a lot to be desired, you're stuck with a stingy 100-sheet paper capacity, and the printer's duty cycle is a light 3000 pages per month. Moreover, consumables must be replaced often and in three inconvenient steps. There are no emulations and no envelope capability.

Although its Casio engine is rated at only 6 ppm, the CrystalPrint Publisher's fast controller helped the unit outpace every other 6-ppm printer in most NSTL speed tests; on the single-page *Ventura* test it even beat several printers with faster engines. Qume attributes this performance to a specialized Weitek RISC microprocessor.

Print quality, however, is quite disappointing. It was impossible to achieve dark, dense blacks without dirtying the page with excess toner and creating smeared and shadowed type.

The CrystalPrint Publisher uses a clone of the Adobe PostScript interpreter, and while it worked fairly well, NSTL found two minor PostScript compatibility problems. First, one NSTL test file would not print at all (Qume says that problem has been corrected in newer releases of the printer's firmware). Second, the printer does not accept downloaded Adobe typefaces.

However, PostScript compatibility is a moot point. The CrystalPrint Publisher's print quality is simply not good enough for discerning users.



Though inexpensive, Qume's CrystalPrint Publisher won't print envelopes and lacks LaserJet emulation.

PIERRE-YVES GOAVEC

EXECUTIVE SUMMARY

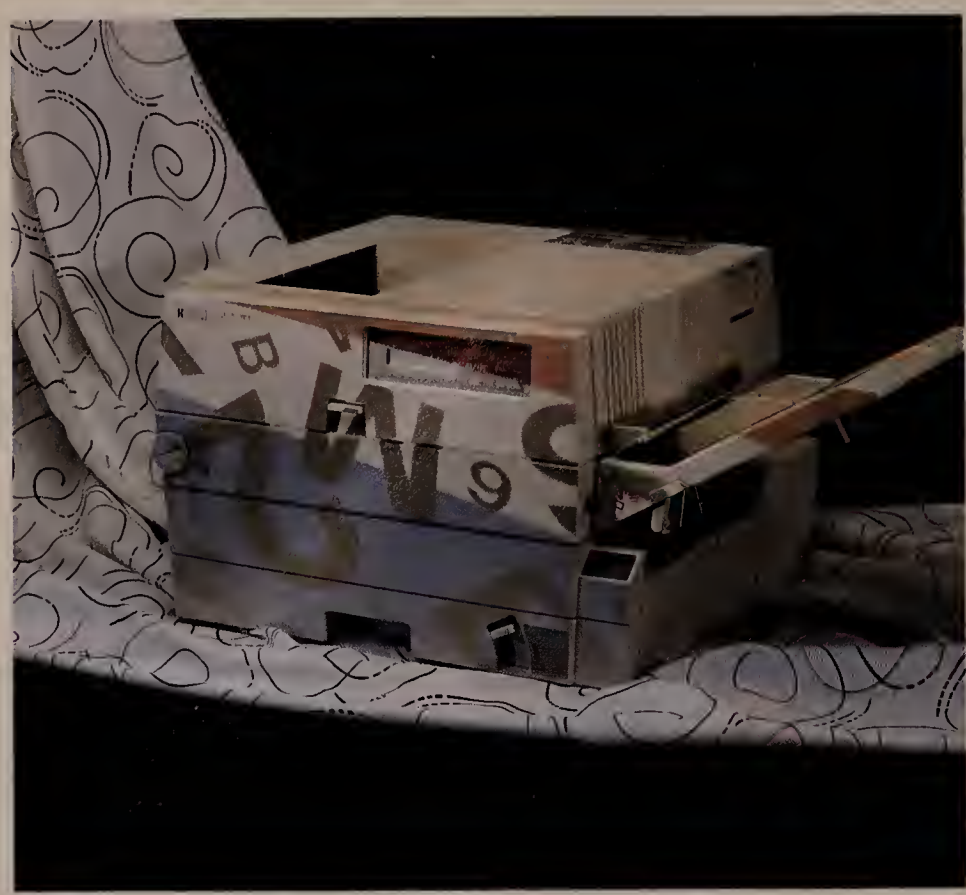
Qume CrystalPrint Publisher

PostScript laser printer

The price is low, but its light duty cycle, tiny paper capacity, inability to print envelopes, and total lack of emulation modes are major minuses. Even its PostScript compatibility is substandard.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Paper handling		●		
Emulation		●		
Print quality (text)			●	
Print quality (graphics)			●	
Speed				●
Overall value			●	

Reader service no. 706



Ricoh's PC Laser 6000/PS delivers a full set of PostScript functions—plus envelope printing—at a bargain price.

PIERRE-YVES GOAVEC

Ricoh PC Laser 6000/PS

Ricoh's low-priced, fully functional PostScript printer, the $4495 PC Laser 6000/PS, is virtually identical to IBM's Personal Page Printer II. The 6000/PS uses the same 1060 print engine that Ricoh supplies to IBM (and GCC Technologies); furthermore, in NSTL speed trials, the 6000/PS and Personal Page Printer finished within seconds of each other (that is, toward the bottom). The only significant differences are that IBM includes 43 fonts, while Ricoh supplies 35; IBM offers a one-year warranty at its dealers, while Ricoh offers 90 days on site; and IBM wants $4999, while Ricoh will settle for $4495.

PC World's 6000/PS review unit produced the best print quality of the three Ricoh 1060-based printers and had the best tonal range of any printer in the roundup. However, some characters were a bit thin, consistently breaking up and showing jagged edges.

Should you buy the Ricoh 6000/PS, as opposed to one of the other two low-cost Ricoh-based printers? It's not an easy call. The 6000/PS has fewer fonts than the IBM and lacks Proprinter emulation—but it costs $500 less. And while the 6000/PS offers LaserJet emulation (which the GCC lacks), it costs $300 more. When you get right down to it, given the importance of fine-tuning the print quality, you probably should not base your selection on brand but should simply pick the unit off the showroom floor that delivers the best-looking output.

Find the Hidden Best Buy

Over a year ago, *PC World* surveyed the field and praised the QMS-PS 810 for its speed and good-looking output (see "PostScript Printers' Progress," May 1988); had it been less expensive, it would have rated a Best Buy. Although the printer has not changed since last year (which is why it is not reviewed here), its price has dropped to $4995, making it a better buy feature for feature than any printer in this roundup.

Even if this year's catch contains no Best Buys, you'll find some attractive choices. If you're looking for the cheapest PostScript buy-in, GCC's Business Laser Printer delivers full functionality for $4199—although it lacks emulations. A mere $296 jump to $4495 buys you the nearly identical Ricoh 6000/PS, plus HP emulation.

EXECUTIVE SUMMARY

Ricoh PC Laser 6000/PS

PostScript laser printer

This low-priced printer has a light duty cycle, but it delivers full PostScript capability, plus the ability to print legal sheets and envelopes without the need for accessories.

	POOR	FAIR	GOOD	EXCELLENT
Standard features			●	
Paper handling			●	
Emulation		●		
Print quality (text)			●	
Print quality (graphics)			●	
Speed		●		
Overall value			●	

Reader service no. 707

Now First Publisher makes your pages really sing.

For a song.

Number 14

Melody Records

HERE THE HOTTEST HITS HAPPEN

Retailers Reprise Rockers

lful of Melody Record's
est retail customers
termined to bring
ur profitable but
recollection of rock
, which haven't been
ix since 1972.

PM Plus chain, with
alifornia outlets, has
nded we reissue
peeding Hipsters,"
gs about Buicks &
des," as well as
dy's all-time top-
ng collection,
aven or Heart-
ak," eclectic rock
from 1952 to 1958,
seminal years of
ly doo-wop and twangy
tar-based bands.

her retail stores in
sconsin and Texas have
o made similar requests,
d E. B. "Buzz" Miller, vice
president of Marketing, has said, "this is just the tip of the oldies iceberg." Which will look good on Melody's bottom line.

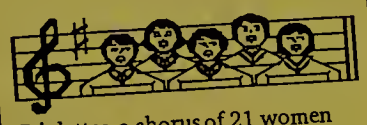
On the same note, another group of previously unreleased recordings by many of these artists will soon be available. Discovered by Melody Records' archivist Rip LaStrange, these new-found old sounds will be available as "Raw Rockers."

One unique feature of this new release will be its denim cover, with copper rivets at the four corners, a pocket and a leather patch which will be similar in design to the Levi's denim jeans so popular in the 1950's.

(cont'd, page 6)

CHORAL CONVENTION COMING

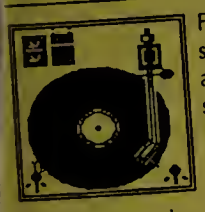
Melody is proud to be a part-sponsor of the annual "Sing It Sister" convention of international women's choral groups. This world-renowned confab brings together some of Melody's most deserving artists in a spotlighted forum that will be satellite broadcast to the USSR, Bulgaria and Sri Lanka for the first time ever, for a projected total of 37.5 million viewers. It's a red-letter event for Melody's own distinctive song stylists, the Des Moinette



Triplettes, a chorus of 21 women made up of 7 sets of singing triplets from Des Moines, Iowa.

(cont'd, page 4)

CHART TOPPERS



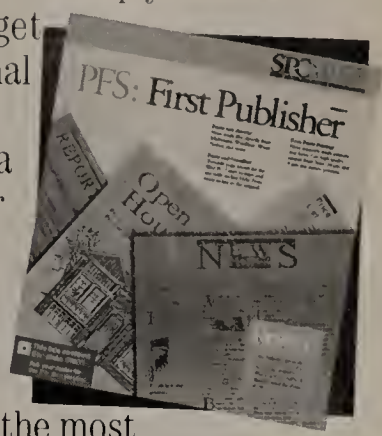
For the second week running, Melody artists show strongly in the top 20 on country, pop and heavy metal charts. This week, country singer Sugar Blues sweetens her position at #19 with her latest, "*Honey, Why'd You Go So Sour?*" The WheelWells roll up to #12 on the pop charts with "*Rocker Arm Assembly.*" And moving to #20 with a bullet in metal is BulletHedd with their latest single, "*Bulls-eye.*" BulletHedd is an L.A. band that's new to the Melody label and showing a lot of promise.

DISTRIBUTOR BLUES?

To keep you up to date on industry trends, Melody Records' CEO Johnny Melody reports many distributors' profit margins are narrower than ever, due to increased vinyl costs and strong competition from CDs and cassettes. Melody says,

(cont'd, page 2)

Easy-to-use, affordable PFS: First Publisher 2.1 from Software Publishing now does even more to help your newsletters and flyers get raves for professional good looks.



It starts with a limited time offer of free top-notch fonts for laser printers. And gives you new features for compatibility with the most popular software and hardware, including WordPerfect™ 5.0 and VGA monitors. Of course, you'll find that help screens, pull-down menus and preformatted templates keep things easy. And with graphic rotation, complex column formats and text wraparounds, you'll have superb design flexibility for more creativity.

You'll get professional quality output with the free disk of Bitstream™ fonts, along with the dot matrix and laser printer support you need for the best results. And for even more design ideas, send in the coupon below.

With PFS: First Publisher 2.1, you'll create great-looking documents that sing your business's praises. At a price you'll applaud.

Call 1-800-255-5550 ext. 535 for new release information.

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Tune up your design skills with free tips on type in a book from Bitstream.™ Just return this coupon with your dated sales receipt showing proof of purchase for PFS: First Publisher 2.0 or 2.1 to: FP Design Booklet Offer, P.O. Box 7210, Mountain View, CA 94039-7210.

Name _____

Address _____

City/State/Zip _____

Offer limited to one per registered user only. Allow 6-8 weeks for delivery. Must be postmarked by December 31, 1989. Not redeemable in store. 53500

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Circle 274 on reader service card

If your office has a bigger printer budget, Apple's $6999 LaserWriter IINTX is probably the best all-around PostScript printer. It delivers higher print speed than any of the Ricoh 1060-based printers and the QMS-PS 810, with no trade-off in print quality or ease of maintenance. If speed is your highest priority and money is no object, the $7995 Dataproducts LZR 1260 offers high-speed printing and a heavy duty cycle—at some loss in print quality.

Expectations for business documents have risen, and PostScript printer capabilities are increasing with them. With continuing improvements in speed, affordability, and print quality, there seems little reason to hesitate about putting PostScript power in your business picture. ●

Daniel Miles Kehoe is a writer and consultant in Oakland, California, who regularly reviews laser printers for PC World.

For more information about all products in this article, circle reader service no. 901.

WHERE TO BUY

Apple LaserWriter IINTX
Apple Computer, Inc.
20525 Mariani Ave.
Cupertina, CA 95014
408/996-1010
LIST PRICE: $6999
ACCESSORIES: hard disk $899, letter-size paper cassette $89, legol-size paper cassette $89, A4-size paper cassette $89, B5-size paper cassette $89; 1MB memary expansian kit $499, 4MB memary expansion kit $1999
CONSUMABLES: toner cartridge $129
WARRANTY: 90 days parts and labar
EXTENDED WARRANTY: available via dealer
TECHNICAL SUPPORT: via dealer
OTHER SUPPORT: nane
Reader service no. 701

Dataproducts LZR 1260
Datapraducts Carp.
6200 Canaga Ave.
Woadland Hills, CA 91365
818/887-8000
LIST PRICE: $7995
ACCESSORIES: universal paper cassette $99; envelope feeder $1095, multicassette sheet feeder $895; hard disk optian $895; user guide $25, maintenance manual $75
CONSUMABLES: taner cartridge $25, developer cartridge kit $225, drum cartridge $329, fuser cartridge $99
WARRANTY: 90 doys, on site, parts and labar, via TRW; ar ane year at factory, parts and labar
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: na tall-free number; telephone suppart available ta distributors, extended to end users as work load permits, M–F 8–5
OTHER SUPPORT: online bulletin baord
Reader service no. 702

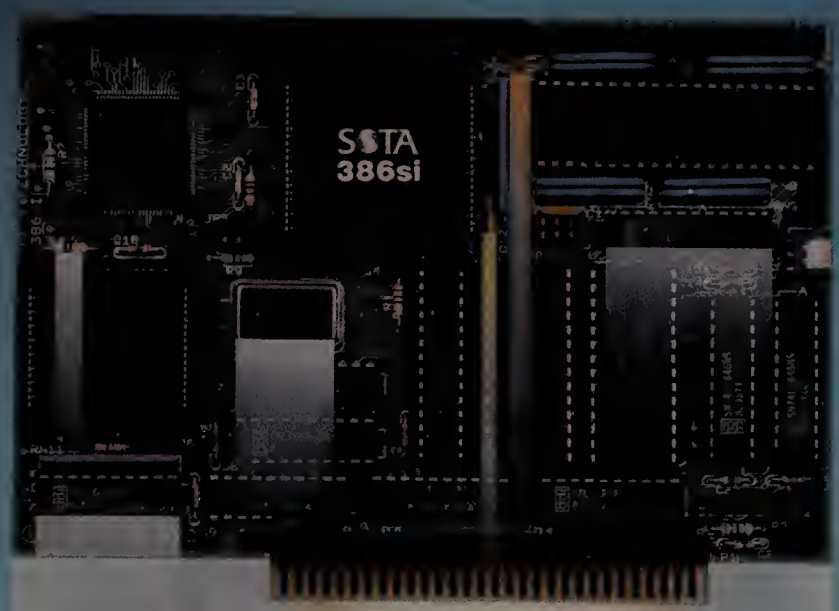
GCC Technologies Business Laser Printer
GCC Technalogies
580 Winter St.
Waltham, MA 02154
617/890-0880
LIST PRICE: $4199
ACCESSORIES: hard disk option $779, user manual $25
CONSUMABLES: toner kit $29, cleaning magazine $65, OPC cartridge $199
WARRANTY: 90 days parts and labor
EXTENDED WARRANTY: available via dealer
TECHNICAL SUPPORT: na tall-free number, M–F 9–6
OTHER SUPPORT: anline suppart via GEnie, CompuServe, AppleLink
Reader service no. 703

IBM Personal Page Printer II
IBM Carp.
101 Paragon Dr., Dept. 122
Montvale, NJ 07645
800/IBM-7257, ext. 122
LIST PRICE: $4999
ACCESSORIES: 2MB memary expansian kit $1495; user manual $68, service manual $27
CONSUMABLES: toner kit $32, cleaning magazine $108, OPC cartridge $218
WARRANTY: one year parts and labar
EXTENDED WARRANTY: various options available
TECHNICAL SUPPORT: 90-day phane suppart, tall-free number, M–F 8–5
OTHER SUPPORT: nane
Reader service no. 704

QMS-PS 1500
QMS, Inc.
One Magnum Pass
Mabile, AL 36618
800/631-2692,
205/633-4300
LIST PRICE: $7995
ACCESSORIES: Adabe dawnloadable fonts $95–$370; Big Bin 4150 expansion paper feeder $795; letter-size paper cassette $75, legal-size paper cassette $75, A4-size paper cassette $75; user manual $25
CONSUMABLES: toner kit (two cartridges) $129, OPC cartridge $165
WARRANTY: 90 doys parts and labar
EXTENDED WARRANTY: available via QMS
TECHNICAL SUPPORT: no toll-free number, M–F 8–5
OTHER SUPPORT: none
Reader service no. 705

Qume CrystalPrint Publisher
Qume Carp.
500 Yasemite Dr.
Milpitos, CA 95035
408/942-4000
LIST PRICE: $4499
ACCESSORIES: letter-size paper cassette $69, legal-size paper cassette $69, A4-size paper cassette $69, B5-size paper cassette $69; user manual $15, service manual $39
CONSUMABLES: taner kit (three cartridges) $99, OPC drum $129
WARRANTY: 90 days, an site, parts and labor (within 50 miles of 200 service outlets nationwide); ar ane year, return-to-depot, parts and labar
EXTENDED WARRANTY: variaus options available
TECHNICAL SUPPORT: no toll-free number, M–F 8–5
OTHER SUPPORT: none
Reader service no. 706

Ricoh PC Laser 6000/PS
Ricah Carp.
3001 Orchord Pkwy.
San Jose, CA 95134
408/432-8800
LIST PRICE: $4495
ACCESSORIES: 2MB memary expansion kit $999; auxiliary input troy $499; face-up exit tray $20
CONSUMABLES: toner kit $29, cleaning magazine $99, OPC cartridge $199
WARRANTY: 90 days, an site, parts and labar
EXTENDED WARRANTY: avoiloble via authorized service centers
TECHNICAL SUPPORT: na tall-free number, M–F 8–8
OTHER SUPPORT: none
Reader service no. 707



THE FASTEST JUST GOT FASTER

Introducing the SOTA 386si
386SX Accelerator for 8088/8086 PC's

1987
MotherCard 5.0

Nominated Technical Excellence
PC Magazine, 1987

"Card Excels in Speedup, Software and Hardware Compatibility"
InfoWorld, Oct. 26, 1987

"The SOTA MotherCard 5.0 is a well-engineered and elegant solution for running OS/2 on a PC."
BYTE, September 1988

1988
SOTA 286i

"SOTA 286i turns Dinosaur into Ripsnorting Demon"
BYTE, December 1988

"This fine performer upgrades a PC or XT-style computer to 50 percent faster than an IBM AT"
InfoWorld, December 5, 1988

"...the most flexible turbo board on the market is the SOTA 286i"
PC Magazine PC Advisor, May 16, 1989

1989
SOTA 386si

SOTA's 386si transforms your aging PC into a performance machine ready to meet the challenges of computing today and tomorrow. Using an 80386SX CPU at 16 MHz, the SOTA 386si benchmarks 19 times faster than an IBM PC. Install the optional 80387SX and get 5 times the numeric processing power of an AT with an 80287.

In fact, speed is just the beginning. The SOTA 386si offers compatibility with both the wide range of 8088/8086 machines and the large variety of add-on boards manufactured. Networks, video boards, tape systems, to name a few, all function flawlessly; whether installed in an IBM XT or an AT&T PC6300. This makes the 386si the perfect solution for the corporate market where an extensive mixture of machines and add-on cards typically coexist.

More than just speed and compatibility, SOTA's 386si provides the flexibility to run today's powerful software. Add the Memory/16i option, and you can even use protected mode programs such as IBM OS/2 and Windows/386. No other manufacturer offers these features. So why buy half a solution when you can buy the fastest, most compatible, most expandable accelerator available. The complete solution — the SOTA 386si.

Options for SOTA 286i/386si:

Memory/16i
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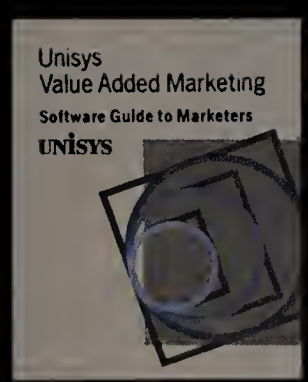

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What Price Power?

Four 25-MHz clones deliver lightning performance at rock-bottom prices.

But only one of these speedsters is trouble-free.

TJ Byers

In the market for a 25-MHz 80386? Finding big-name–PC prices too steep? You'll be happy to discover there's an abundance of inexpensive generic clones that can make even *Windows/386* and OS/2 run fast enough to behave like decent operating systems.

The four systems reviewed here are clearly commodity items. Three—the Amax PC/386, the Blackship 386/25, and the Zeos 386-25/DT—were selected so we could evaluate their motherboards, popular boards found in a number of generic PCs. The fourth, the CompuAdd 386/25, was included because of the manufacturer's growing market share and prominence. Taken together with our last 25-MHz 80386 roundup ("25-MHz Speedsters—A Buyer's Market," *PCW*, June 1989), in which we reviewed (among others) the Micro Express ME 386-25 (AMI motherboard) and the Hertz 386/25 (Intel motherboard), this article completes our survey of the major 25-MHz motherboards in cloneland. Using our ratings, you can make an educated guess about the performance of other systems that use one of these boards.

The Blackship 386/25 can address a whopping 16MB of CPU-speed RAM.

TONY CARLSON

Just as with the last roundup, National Software Testing Laboratories (NSTL) put the systems through a series of rigorous performance and compatibility tests. With one exception, the systems finished in a virtual dead heat in the NSTL speed trials—and came close to tying the high-priced industry standard, the Compaq Deskpro 386/25.

For price comparison, the systems were set up in *PC World*'s standard 25-MHz configuration: 4MB of 32-bit RAM, a 1.2MB floppy drive, a 150MB ESDI hard disk, at least one parallel and one serial port, a VGA video board and color monitor, a 101-key keyboard, and DOS 3.3 or a later version. All systems included ROM-based setup and support for an 80387 or a Weitek 3167 math coprocessor.

Rock-bottom price is what these PCs are all about. Each system comes in a generic,

full-size AT chassis. The box supports three stacked, externally accessible half-height drive bays and two stacked, internal half-height bays; also standard are a front-panel reset button and a keyboard keylock. The systems lack bundled software, except for an occasional utilities or diagnostics disk, and disk caching is not included. User manuals are lean, at best. Only the CompuAdd 386/25 includes an on-site warranty as standard.

Amax PC/386

Priced at $6650 in the *PC World* configuration, the Amax PC/386 is the cheapest system in this roundup, but only by $25. Unfortunately, it seems a bit shaky: Under certain conditions, it locked up.

The Amax PC/386 comes with a Micronics motherboard, revision 3A. As with all the systems in this roundup, a memory board holds all 32-bit CPU-speed memory. The board is expandable to 8MB using 256K-bit memory chips; an optional 8MB daughtercard uses Single In-line Memory Modules (SIMMs) and raises the memory ceiling to 16MB of CPU-speed RAM.

Clock speed is software switchable between 25 MHz, 8 MHz, and 6 MHz, or you can use a slide switch on the back panel to toggle between 8 MHz and 25 MHz. Flipping the switch, however, sometimes locked up the system. On occasion, floppy disk I/O errors caused the PC to freeze as well; it took a power-off reset to restore operations.

The Micronics motherboard supports two 8-bit and five 8/16-bit slots. In our standard configuration, only four slots are left free. Because of a movable serial/game-port bracket, one slot can't accommodate boards with ports.

While the Amax's price is attractive, we can't recommend a PC that locks up so easily. Amax says it is now shipping revision 5A of the motherboard, which is trouble free—so make sure to tell the salesperson you want revision 5A.

EXECUTIVE SUMMARY

Amax PC/386

25-MHz 80386-based computer

This is the least expensive system in the roundup, but our test unit locked up several times. Reportedly, the company is now shipping a more recent revision of the Micronics motherboard, which should make the Amax PC/386 a better system at a good price.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability			●	
Ergonomic design		●		
Performance				●
Overall value			●	

Reader service no. 710

Blackship 386/25

In many respects, the Blackship 386/25 closely resembles the Amax PC/386, although at $6875 in the *PC World* configuration, it lists for $225 more. However, that

EXECUTIVE SUMMARY

Blackship 386/25

25-MHz 80386-based computer

The Blackship 386/25 costs only $225 more than the Amax, but it uses the more recent and more reliable Micronics motherboard. Moreover, memory and other upgrades from Blackship are significantly cheaper than those from Amax. But it's still a bit pricey compared with faster clones based on the AMI motherboard.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability			●	
Ergonomic design		●		
Performance				●
Overall value			●	

Reader service no. 711

The Zeos 386-25/DT is the most expensive machine in the roundup—and its Mylex motherboard malfunctions when hot.

TONY CARLSON

$225 gets you 64K of memory cache instead of 32K, which may speed up such memory-intensive operations as multitasking under OS/2. And although the Blackship uses a Micronics motherboard, it's the improved revision 5A.

Like the Amax, the Blackship sports two 8-bit and five 8/16-bit slots. The two machines also share a 16MB memory ceiling and turn in nearly identical performance. However, upgrading the Blackship is significantly cheaper. For example, a 4MB daughtercard costs $630 less from Blackship, and an 8MB daughtercard is $1260 cheaper.

Error-free operation and the low-cost upgrade make the Blackship 386/25 a tempting buy, but keep in mind that on-site service is not available more than an hour's drive from Blackship's Fremont headquarters. The Micro Express ME 386-25 (reviewed in June) shares this failing, but it's considerably faster and sells for hundreds of dollars less.

CompuAdd 386/25

Considering the CompuAdd 386/25's low $6675 list price in the *PC World* configuration, CompuAdd's free year of on-site service is indeed a generous touch. Unfortunately, the unit we reviewed came in last on all of NSTL's performance tests, and it displayed two major compatibility problems.

First, a conflict between the Adaptec ESDI controller and the system BIOS prevented the CompuAdd 386/25 from running *PC-Kwik*. Second, the system could not access the floppy drive from within *Windows/386*. At this writing CompuAdd is shipping its 386/25 with a Western Digital 10007 ESDI controller, which the company claims solves the first problem, while a new version of the Award system BIOS purportedly solves the second.

The proprietary motherboard holds one parallel and two serial ports. One 8-bit slot and six 8/16-bit slots are built into the board, and you end up with five of them free. A 32-bit memory board supports upgrade options of 1MB to 4MB (in 1MB increments) using 256K SIMMs, or 4MB to 16MB (in 4MB increments) using 1MB SIMMs (SIMM types cannot be mixed).

Despite CompuAdd's growing prominence, the 386/25 review unit we received doesn't make the grade. The cleaned-up version's new BIOS and controller could add up to a sensible buy, especially considering the free on-site service. However, we can't recommend a machine sight unseen.

EXECUTIVE SUMMARY

CompuAdd 386/25

25-MHz 80386-based computer

The CompuAdd 386/25 comes with one year of free on-site service, which is unprecedented for such a low-priced machine. However, performance lags behind the roundup's other systems, and the review unit suffered compatibility problems (which the company claimed to have fixed at press time).

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability				●
Ergonomic design			●	
Performance			●	
Overall value			●	

Reader service no. 712

Zeos 386-25/DT

At $7135 in the *PC World* configuration, the Zeos 386-25/DT is this roundup's most expensive machine. Furthermore, the system's Mylex motherboard (version 007) has some serious problems.

The Zeos 386-25/DT comes with your choice of an AMI or a Mylex motherboard. We chose the Mylex to round out our survey of motherboards because the board includes several unique features. For example, its memory cache is expandable to 128K—four times larger than the CompuAdd's cache and twice as big as the Micronics motherboards'. NSTL tested the machine with a full 128K cache. More important, in addition to one 8-bit slot, four 8/16-bit slots, and a proprietary 32-bit memory slot, the board sports two 32-bit expansion slots that comply with Intel's de facto standard.

The memory board that comes with the system holds up to 8MB in 1MB SIMMs—an underwhelming amount of CPU-speed RAM for a 25-MHz machine. However, you can install an 8MB, 32-bit memory expansion board from Intel in each Intel slot to reach a maximum of 24MB of CPU-speed RAM.

Unfortunately, the Mylex 007 motherboard proved quite problematic. The first one we tested suffered heatstroke within 15 minutes and died. Its replacement worked better but still occasionally locked up because of overheating. Zeos agrees that the Mylex motherboard is more temperature sensitive than the AMI and says that Mylex is working on the problem.

EXECUTIVE SUMMARY

Zeos 386-25/DT

25-MHz 80386-based computer

This system offers two motherboard options. The Mylex motherboard tested supports a 128K memory cache and two 32-bit Intel slots; unfortunately, it quit working when it got hot. The AMI motherboard version (not tested) is $1000 cheaper and presumably much steadier.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability			●	
Ergonomic design		●		
Performance				●
Overall value	●			

Reader service no. 713

FEATURES EVALUATION

Blackship 386/25: Reliability at a Good Price

Although the Amax and the CompuAdd are lower in price, and the Zeos can address more memory at CPU speed, the Blackship was the only machine tested that was entirely trouble-free.

● Yes ○ No ◒ Deficient

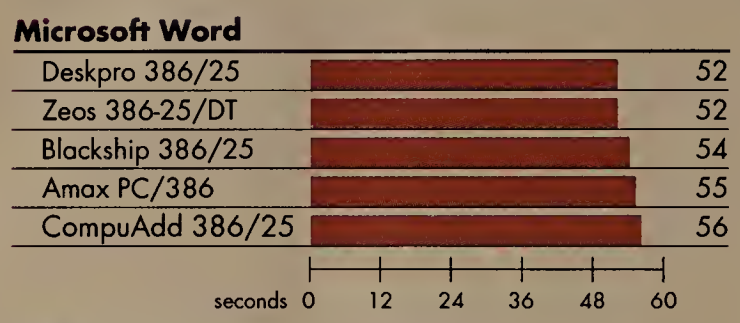
	Amax PC/386	Blackship 386/25	CompuAdd 386/25	Zeos 386-25/DT
Standard features				
Price	$6650 [1]	$6875 [1]	$6675 [2]	$7135 [1]
Clock speed (MHz)	25/8/6	25/8/6	25/8	25/8
Built into motherboard				
Parallel port	○	○	●	○
Serial port	○	○	●	○
Floppy disk controller	○	○	○	○
Mouse port	○	○	○	○
Coprocessor support	80387/Weitek	80387/Weitek	80387/Weitek	80387/Weitek
Disk caching software	○	○	○	○
Memory bus capacity	16MB	16MB	16MB	24MB
Expandability				
32-bit expansion slots/number free	1/0	1/0	1/0	3/2 [3]
8/16-bit expansion slots/number free	5/4	5/3	6/4	4/2
8-bit expansion slots/number free	2/1	2/1	1/1	1/0
Half/full-height storage device bays	5/2	5/2	5/2	5/2
300MB+ hard disk available from maker	◒ [4]	◒ [4]	●	●
Ergonomic design				
Switchless setup	○	○	○	○
Compact footprint	○	●	○	○
Complete documentation	○	○	●	○
Tilt-and-swivel monitor	●	●	●	●
Front-panel reset button	●	●	●	●
Front-panel on/off switch	○	○	○	○

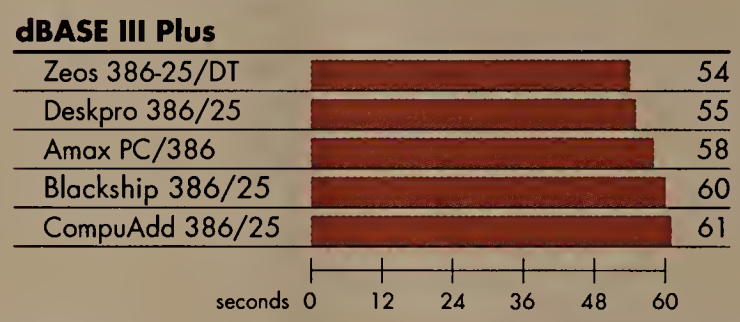
[1] Price based on 4MB of 32-bit RAM, 1.2MB floppy drive, 150MB ESDI hard disk, at least one parallel and one serial port, VGA video board and color monitor, 101-key keyboard, and DOS 3.3.
[2] Same as footnote 1, except with DOS 4.01.
[3] May be used as 8/16-bit slots when not occupied.
[4] Must be special ordered.

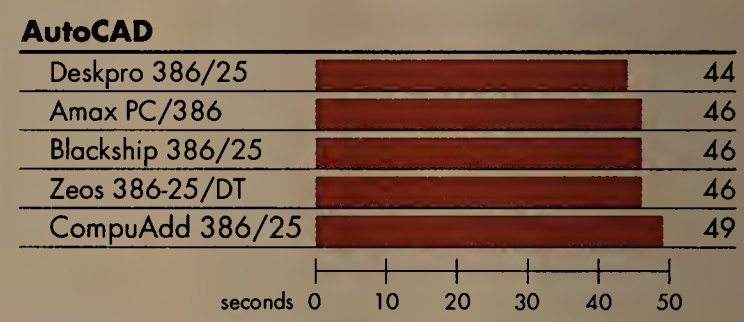
NSTL TEST REPORT

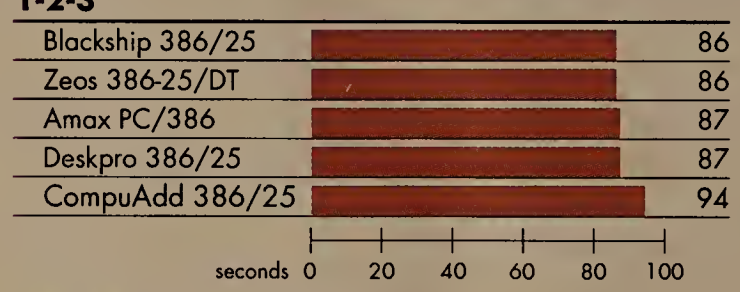
Zeos Edges Other Clones in 25-MHz Speed Trials

NSTL testing finds surprisingly similar (and highly impressive) performance from four low-priced 25-MHz 80386 systems. The Zeos 386-25/DT takes top honors, but the Blackship 386/25 and the Amax PC/386 are only a hair slower. CompuAdd's 386/25 brings up the rear. None, however, match the performance of Compaq's Deskpro 386/25.









Methodology
All machines were tested with a coprocessor and a 256K extended memory disk cache, except in the *1-2-3* benchmark. The Blackship 286/25 was configured with a 170MB hard disk and 5MB of RAM. The Zeos 386-25/DT was configured with a 170MB hard disk and 4MB of RAM. The Amax PC/386 was configured with a 90MB hard disk and 2MB of RAM. The CompuAdd 386/25 was configured with a 160MB hard disk and 4MB of RAM. The Compaq Deskpro 386/25 was tested with a 300MB hard disk and 3MB of RAM.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepore and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

Microsoft C 5.0
The Microsoft C benchmark measures the time required to compile and link XLISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using *AutoCAD's* EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

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President
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Once those thermal problems are solved, high performance and an expandable cache could make the Mylex an impressive motherboard. Until then, you're probably better off with the AMI-motherboard version of the 386-25/DT—which makes the system $1000 cheaper in the *PC World* configuration.

Good and Cheap

Although this roundup produced no Best Buys, it certainly proves that you can get 25-MHz performance without selling the family jewels. It also reminds us of the dangers lurking in the clone jungle.

The Blackship 386/25 is a smart buy, offering low-cost upgrades and no serious problems. Presumably, now that Amax is shipping the revision 5A Micronics motherboard, its PC/386 is also worthy.

We can't recommend a machine we haven't tested, but tests of the Micro Express ME 386-25 (reviewed in the June issue), which uses the same AMI motherboard, suggest that the AMI version of the Zeos 386-25/DT might well have ended up as top-dog clone—and the lowest priced.

With complex business software demanding faster hardware, it's refreshing to see that some lowball 25-MHz systems deliver good value. Just bear in mind that shopping on the low end is only for those who are comfortable peeking under the hood. ●

TJ Byers is a contributing editor for PC World.

For more information about all products in this article, circle reader service no. 903.

WHERE TO BUY

Amax PC/386
Amax Engineering
47315 Mission Folls Ct.
Fremant, CA 94539
415/651-8886
LIST PRICE: with 1MB RAM, 32K coche, 1.2MB floppy drive, 1:1 interleave DTC hord disk contraller, ane parollel and ane seriol part, gome port, 101-key keyboard $3455; with 4MB RAM, 150MB ESDI hard disk, twa serial ports, VGA board and color monitor, DOS 3.3 $6650
ACCESSORIES: 64K cache upgrade $165; memory doughtercard with 4MB $2125, memory daughtercard with 8MB $3750; 20MB hard disk $295, 40MB hard disk $580, 80MB hord disk $830, ESDI quotes available on request; 1.44MB flappy drive $115; VGA baard and monitar $800; 80387 moth copracessar $765; DOS 3.3 ar 4.01 $80
WARRANTY: one year parts and labor
EXTENDED WARRANTY: on-site service ovoilable
TECHNICAL SUPPORT: toll-free number, M–F 8:30–5:30
OTHER SUPPORT: nane
Reader service no. 710

Blackship 386/25
Blackship Troding Co.
4031 Clipper Ct.
Fremont, CA 94538
800/654-7955
LIST PRICE: with 1MB RAM, 64K coche, 44MB hard disk, 1.2MB floppy drive, ane porollel ond two serial ports, gome port, manachrome cord and monitar, 101-key keyboard $3995; with 4MB RAM, 150MB ESDI hord disk, VGA baard and color monitar, DOS 3.3 $6875
ACCESSORIES: 1MB RAM $395, 4MB RAM $995, 8MB RAM $1980; 80MB hard disk $689, 150MB ESDI hard disk and controller $1495, memory daughtercard with 4MB $1495, memory doughtercard with 8MB $2490; 80387 math coprocessar $695; EGA board and monitar $559, Poradise VGA Plus 16 baard and monitor $850; DOS 3.3 $90, DOS 4.01 $115
WARRANTY: one year parts and labor
EXTENDED WARRANTY: nane
TECHNICAL SUPPORT: no toll-free number, M–F 8–5
OTHER SUPPORT: none
Reader service no. 711

CompuAdd 386/25
CompuAdd Corp.
12303 Technology Blvd.
Austin, TX 78727
800/627-1967
LIST PRICE: with 1MB RAM, 32K coche, 1.2MB floppy drive, one parallel and twa serial parts, 101-key keybaard $2895; with 4MB RAM, 150MB ESDI hord disk, VGA baard and color monitor, DOS 4.01 $6675
ACCESSORIES: 1MB RAM $549, 4MB RAM $1899; 1.44MB floppy drive $89; 40MB hord disk $319, 71MB hard disk $569, 110MB RLL hard disk $895, 150MB ESDI hard disk $1349, 320MB ESDI hord disk $1899; VGA baard and monitor $695; DOS 4.01 $89
WARRANTY: 30-day full refund, one year an-site service
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: toll-free number, M–F 8–7
OTHER SUPPORT: none
Reader service no. 712

Zeos 386-25/DT
Zeos Int'l
530 5th Ave. NW #1000
St. Paul, MN 55112
612/633-4591
LIST PRICE: with 1MB RAM, 128K cache, 65MB hard disk, 1.2MB floppy drive, one parallel and one serial part, monachrome baard and monitor, 101-key keyboard $4495; with 4MB RAM, 150MB ESDI hard disk, VGA board and color monitor, DOS 3.3 $7135
ACCESSORIES: 2MB RAM $499, 4MB RAM $999; 1.44MB flappy drive $159; 80MB Seagote hard disk $275 (with return of 65MB drive), 115MB RLL hard disk $300 (with return af 65MB drive), 160MB ESDI hard disk $998, 337MB ESDI hard disk $1095, 674MB ESDI hard disk $3375; Calarado Memary Systems QIC-40 streaming tape backup $398; disk caching cantroller with 512K $995, disk caching controller with 4MB $3435; Poradise VGA Plus boord and monitar $695, Paradise VGA Plus 16 board and Tatung multiscan manitar $845; 80387 math copracessar $699; DOS 3.3 $98, DOS 4.01 $119
WARRANTY: 30 days no-questions-osked refund, ane yeor parts and labor
EXTENDED WARRANTY: $299 per year (bose configuratian) ot time af purchose, $349 per year (base configuration) if acquired after purchase; aptions priced separately
TECHNICAL SUPPORT: tall-free number, 24 hours, seven doys o week
OTHER SUPPORT: nane
Reader service no. 713

Ramses II was not one to mince words. When it came to getting a point across, he was very direct — what was written was in fact etched in stone.

If he ruled today — in this exciting *Information Age* — he'd feel compelled to update his method to input and retrieve information. Being the meticulous type, Ramses would choose page recognition software that was accurate, fast and above all, flexible. Ramses would definitely choose *OmniPage*® when doing page recognition with his 286 or 386 computer.

Let's face it, some scribes have less than perfect "*chipmanship.*" Ramses would require the most versatile page recognition software — one that could scan any font or font size, even multiple columns of text — no matter which scribe created it. There's nothing more frustrating than a misplaced hieroglyph. He'd definitely want it to support the most powerful word processors available in the known world. When it comes to page recognition software, he'd want the very best product at the best possible price.

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Can you really blame him? There's just no substitute for a powerful, full-featured page recognition package. Can you afford to make a mistake when your entire "dynasty" depends on it?

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So It Shall Be.

Means that *OmniPage/386* can read virtually any font, in sizes that range from 8 pt. to 72 pt.

This unique landscape feature means that spreadsheets and financial documents are only a scan away. A great addition to your royal granary if storing and accessing numerical data really counts!

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Circle 17 on reader service card

Communications Software: Easy Choices

If you're in the market for a communications package, look beyond the old standbys.

Our top picks are packed with features, easy to use, and surprisingly low priced.

George Campbell

With all the unknowns involved in going on line, asynchronous communications may never be as easy as sending express mail or a fax. Yet, many communications programs complicate the process unnecessarily. Although new features such as data compression, powerful script languages, and multitasking boost productivity, few programs deliver those benefits in easy-to-use form.

Fortunately, you can have your cake and eat it, too. As this roundup of nine communications packages reveals, differences between the functionality of formidable, high-cost heavyweights such as *Relay Gold* and *Smartcom III* and inexpensive, easy-to-use programs such as *ProComm Plus* and *Qmodem SST* are relatively insignificant.

Despite the similarities, the programs fall into three broad groups. *Boyan 4.0*, *ProComm Plus 1.1b*, and *Qmodem SST 4.0* are low-cost shareware and ex-shareware programs built around a dialing directory. *Crosstalk XVI 3.7*, *Mirror III 1.0*, and *Freeway Advanced 3.0* vary in functionality, but all support *Crosstalk XVI*'s command syntax. At the high end are *Crosstalk Mk.4 1.1*, *Relay Gold 3.0*, and *Smartcom III 1.1a*—powerful packages targeted at corporate users and developers.

Top Tools for Telecommunications

The best package for you depends on how you use your modem. If you're a BBS habitué, you'll want a centralized dialing directory that can automatically queue and redial numbers. If you commonly send and receive files, look for multiple error-correction protocols. Micro-to-mainframe users need a capable set of terminal emulation drivers.

However, because your needs may change over time, look for a program with a judicious mix of all these features—and more. A built-in text editor is advisable, as is the ability to set up macros to hot key to your word processor. A file manager with full directory support is also valuable. On line, you'll want keystroke macros for automating command input, as well as a capture buffer that saves text that has scrolled by.

In the realm of error-correction protocols, Kermit and XMODEM are essential, but it's nice to have extras such as CompuServe-B and ZMODEM, too. If you plan on using a high-speed error-correcting modem, you'll need a streaming protocol such as

YMODEM-G that error-checks transfers without slowing throughput.

Another must is a script language that you can use to log on to services and transfer files while you're away. A learn mode that records your keystrokes to create log-on scripts is also useful. Programmers will want windowing commands for sculpting custom front ends, and math functions for on-line financial applications.

A remote option is important if you (and others) need to send files to and receive files from an unattended PC. A first-class remote mode requires that callers supply a password and then guides them with menus once they are admitted. Make sure the package admits those using different programs and gives authorized users access to DOS.

Multitasking support, another time-saver, comes in many forms. Five of the reviewed programs let you start a file transfer, then work in another application while the transfer proceeds in the background. Other programs achieve the same end by running under multitasking environments such as *Desqview* or *Windows/386*. Finally, a few programs aimed at power users let you run simultaneous sessions over Tymnet or using multiple modems.

Speed is important, but as National Software Testing Laboratories (NSTL) benchmarks reveal, it depends primarily on your modem. Exceptions to this rule are *Mirror III*, *Relay Gold*, and *Smartcom III*, which boost speed with data compression schemes when connected to matching programs. However, MNP 5 modems can do the same job faster. Background file transfers vary considerably: With a *1-2-3* macro executing in the foreground, *Mirror III* offered the fastest background file transfers.

Ultimately, the critical performance factor is the time required to learn and use the program. If you're constantly slogging through menus or hunting through the manual, your time and money are wasted—thus, the bona fide charm of *ProComm Plus*.

MICHAEL LLEWELLYN

ProComm Plus 1.1b

Datastorm's $89 *ProComm Plus* has undergone only minor upgrades since *PC World* reviewed it in September 1988, but it still wins a Best Buy. Coupling a flexible interface with comprehensive features, *ProComm Plus* is recommended for everyone from weekend BBS cruisers to corporate communicators.

ProComm Plus offers both a *1-2-3*–style command line and mnemonic <Alt>-*key* shortcuts that summon full-screen menus and pop-up dialog boxes. Easy installation, lucid documentation, and on-line help make it easy to jump in quickly without scouring the manual. The defaults are well chosen, and the program is easy to customize.

Datastorm wisely put the dialing directory at the heart of *ProComm Plus*. You can

FEATURES EVALUATION

Up From Shareware: Big Values at a Low Price

ProComm Plus, Qmodem SST, and Mirror III features nearly match those of their more expensive rivals, and they're much easier to use.

● Yes ○ No ◒ Deficient
▼ Limited only by available disk space

	Boyan 4.0	Crosstalk XVI 3.7	Crosstalk Mk.4 1.1	Freeway Advanced 3.0	Mirror III 1.0	ProComm Plus 1.1b	Qmodem SST 4.0	Relay Gold 3.0	Smartcom III 1.1a
Standard features									
List price	$65[1]	$195	$245	$139	$99.95	$89	$60[1]	$295	$249
RAM required	256K	256K	320K	334K	256K	192K	384K	192K	512K
Messaging									
Directory entries	200[2]	64,000	▼	108	▼	200[2]	200[2]	▼	▼
Auto-capture buffer	●	●	●	●	●	●	●	●	●
Cut and paste from buffer	●	○	●	○	◒[3]	◒[3]	◒[3]	●	●
On-line text editor	○	○	●	◒[4]	●	●	●	●	●
Hot key to external word processor	●	●	●	○	●	●	●	●	○
Split-screen chat mode	●	○	○	○	●	●	●	●	○
Queue dialing	●	○	○	○	●	●	●	○	○
File transfer protocols									
Kermit	●	●	●	●	●	●	○[5]	●	●
XMODEM/XMODEM CRC	●	●	●	●	●	●	●	●	●
YMODEM-G	●	○	●	●	●	●	●	○	●
CompuServe B	●	○	●	●	●	●	○[5]	○	○
ZMODEM	●	○	●	○[5]	○[5]	○[5]	○[5]	○	○
Proprietary	○	●	●	●	●	○	○	●	○
Data compression	○	○	○	○	●	○	○	●	●
Terminal emulation									
TTY	●	●	●	●	●	●	●	●	●
VT 100/102/52	◒[6]	●	●	●	●	●	◒[7]	●	●
ANSI	●	◒[8]	●	●	●	●	●	●	●
IBM 3101	○	●	●	○	●	●	○	●	○
Other emulations offered	0	3	19	0	10	10	0	5	0
Session automation									
Script language	●	●	●	●	●	●	●	●	●
Learn mode	◒[9]	○	●	●	●	●	●	◒[10]	●
Predefined scripts	○	●	●	○	●	●	●	●	●
Keyboard macros	●	●	●	○	●	●	●	●	●
Remote operations									
Remote access	●	●	●	●	●	●	●	●	●
Remote access to DOS	●	●	●	○	●	●	●	●	●
Remote menus	●	○	○	●	○	●	●	●	●
Works with different communications programs	●	●	●	○	●	●	●	○	●
Multitasking									
Background file transfer	○	●	○	●	●	○	○	●	●
Windows/386 support	○	●	●	○	○	●	●	○	○
Desqview support	○	●	○	○	○	●	●	●	○
Number of multiple sessions	0	0	15	0	0	0	0	15	8

[1] Full registration with printed manual.
[2] Limited only by disk space with multiple directories.
[3] Limited to copying screen to file.
[4] Can't load or save files.
[5] Protocol can be obtained from BBSs and added to the program.
[6] No VT 102.
[7] VT 100 only.
[8] Displays full-screen graphics poorly.
[9] No true learn mode; you must cut and paste prompts and responses from capture buffer.
[10] Learn mode limited to TTY emulation.

easily view and modify parameters, locate entries by keyword or number, and tag entries for queue dialing and redialing. The limited editor lacks word wrap, but a word processor can be summoned by a hot key.

ProComm's extensive list of 13 file transfer protocols and 16 keyboard-mappable terminal emulations ranks with the heavyweights. *ProComm* notes the time it will take to transfer a file and shows progress with a bar graph. During PC-to-PC communications, you can split the screen into send and receive windows to simplify on-line chats. The superb menu-driven remote access mode resembles a simple BBS. It offers two levels of security and can lock out callers not on an approved list.

ProComm's BASIC-like script language may not equal *Mk.4*'s CASL or *Mirror III*'s PRISM, but it provides almost everything you need for automating unattended sessions. It lacks powerful math functions but supplies a debugger, conditional and loop commands, and windowing commands for creating custom menus. The learn mode performs capably, and you can set up multiple groups of keyboard macros.

ProComm Plus nearly equals the power of packages twice its price. That, along with ease of use, makes it the best value in the roundup.

EXECUTIVE SUMMARY

ProComm Plus 1.1b

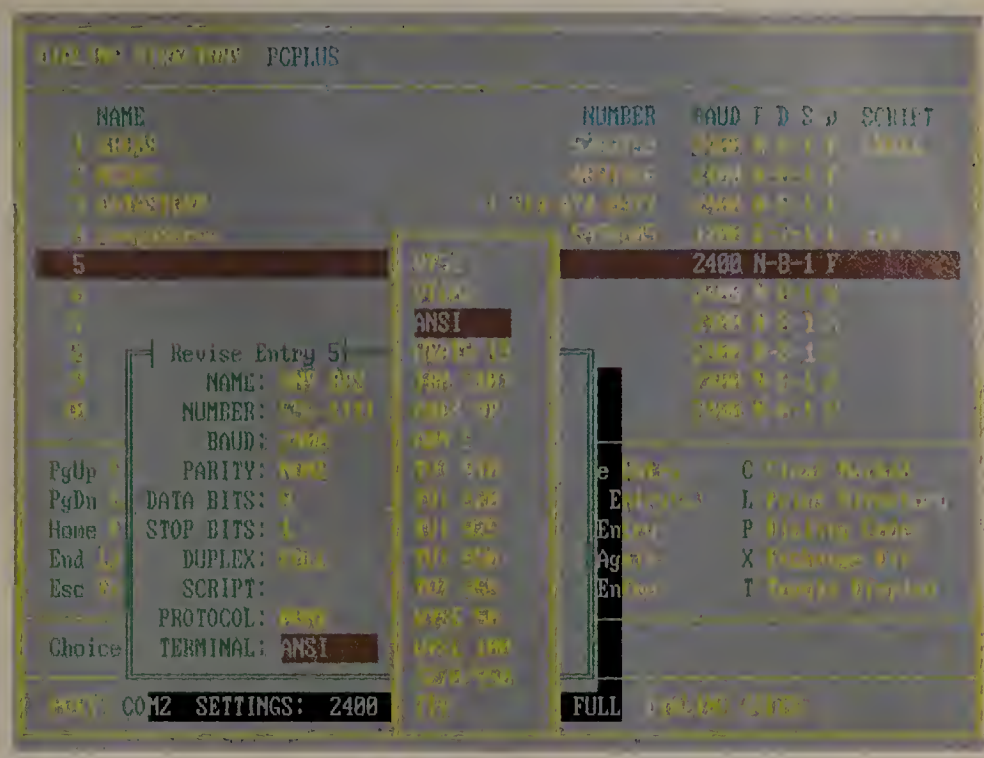
Communications software

BEST BUY

The *PC-Talk* of the 1990s, *ProComm Plus* will meet the communications needs of home and business users. Offering surprising sophistication in a friendly package, *ProComm Plus* wins the only Best Buy in the roundup.

	POOR	FAIR	GOOD	EXCELLENT
Messaging				●
File transfer			●	
Terminal emulation				●
Session automation				●
Remote operations				●
Multitasking		●		
Overall value				●

Reader service no. 602



A wide variety of terminal emulations has added to ProComm Plus's success.

Qmodem SST 4.0

The Forbin Project's *Qmodem SST* almost beats *ProComm Plus* at its own game. Version 4.0 adds a top-notch remote mode and editor while maintaining its friendly inter-

EXECUTIVE SUMMARY

Qmodem SST 4.0

Communications software

Qmodem SST delivers considerable power but doesn't lose touch with its friendly shareware roots. However, lack of terminal emulations and protocols keeps it a step behind *ProComm Plus*.

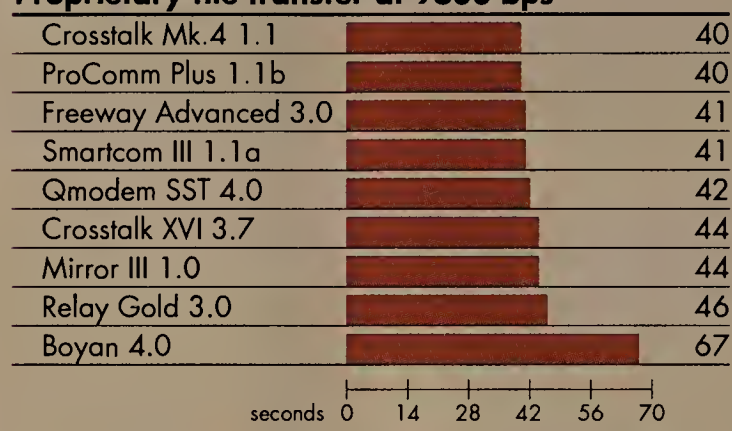
	POOR	FAIR	GOOD	EXCELLENT
Messaging				●
File transfer		●		
Terminal emulation	●			
Session automation			●	
Remote operation				●
Multitasking		●		
Overall value			●	

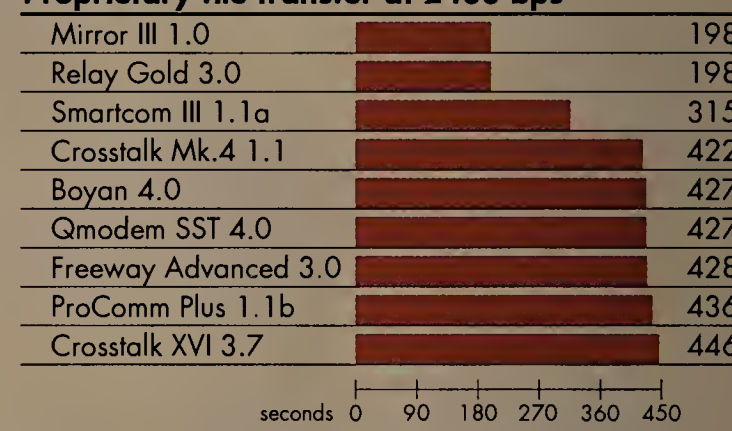
Reader service no. 616

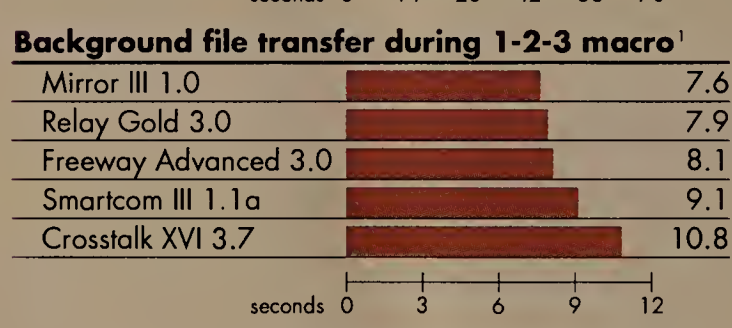
NSTL TEST REPORT

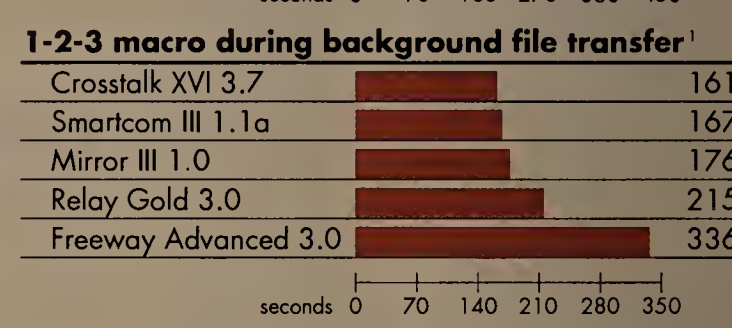
Communications Packages: A Close Call

There are scant performance differences among these communications packages, save for the fast throughput of the three data-compressing programs—Mirror III, Relay Gold, and Smartcom III—when used with non-data-compressing modems. Mirror III is the overall winner among the programs that provide background transfers.









[1] Crosstalk Mk.4, ProComm Plus, Qmodem SST, and Boyan do not support background data transfer and so could not perform these tests.

Methodology
All tests were conducted using a pair of 12-MHz Compaq Deskpro 286s.

Proprietary file transfer at 9600 bps
A 100K ASCII file is transferred using a pair of 9600-bps Microcom QX/V.32c modems, which feature automatic MNP Level 5 data compression and error correction. The benchmark file is sent between two systems running the same communications program, using the fastest protocol specified by the vendor for this configuration (usually YMODEM-G).

Proprietary file transfer at 2400 bps
This test is the same as the 9600-bps test except it uses a pair of Hayes 2400-bps modems. The benchmark uses the fastest protocol (specified by the vendor) for performance. These 2400–bps modems do not provide error correction, so the transfers were made using an error–correcting protocol.

Background file transfer during 1-2-3 macro
With each program loaded in memory-resident mode, a 100K file is transferred from a system using *DSZ* (a shareware communications program) to a system using the test program. All the programs were configured for minimum memory overhead, stripped of modules and buffers as indicated in their respective manuals. The connection is made using the XMODEM protocol with Hayes 2400-bps modems. Once the transfer begins, a *1-2-3* macro executes in the foreground. This test measures the speed of one file transfer.

1-2-3 macro during background file transfer
This test is the same as the previous test, except that it measures the speed of the macro itself. Without any background file transfer, the macro normally runs in 154 seconds.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

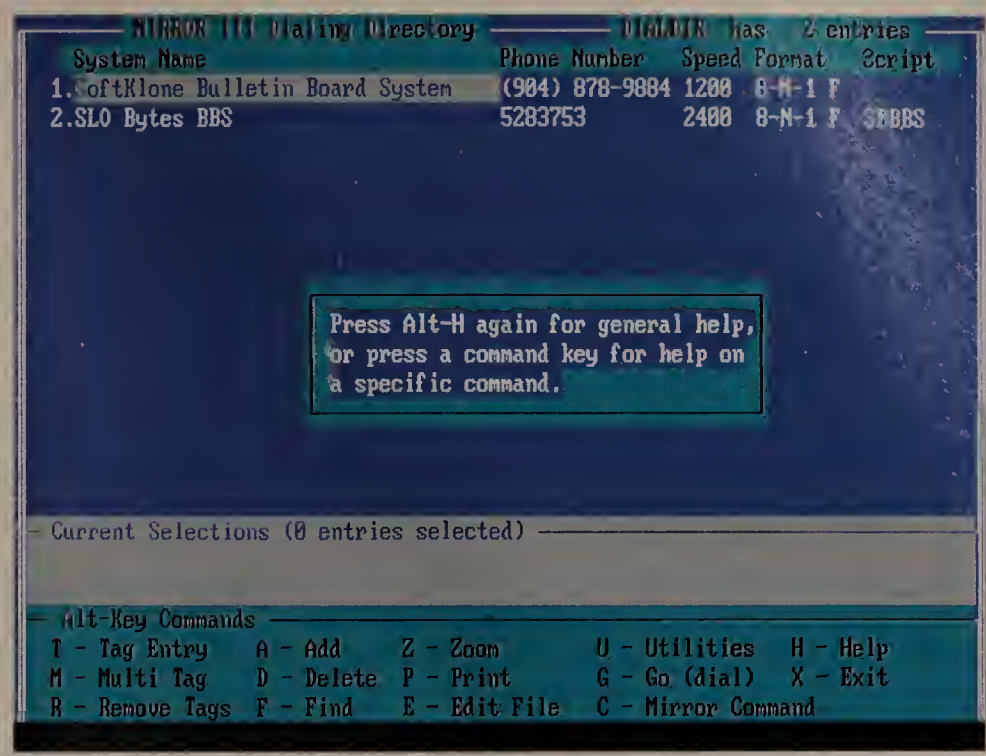
face. You can pick up this shareware bargain for $45 or test-drive it for only $15; a printed manual costs $15 extra. However, because *Qmodem SST* lacks *ProComm*'s extensive terminal emulations and transfer protocols, it takes second place in overall value.

Like *ProComm Plus*, *Qmodem* relies on a central dialing directory, mnemonic <Alt>-*key* commands, and pop-up menus. Unlike *ProComm Plus*, it has no *1-2-3*–style menu, but there is context-sensitive help. You can easily search and sort directory entries, tag them for queue dialing, and attach notes. The customizable *WordStar*-like editor is the best in the roundup, offering cut and paste and automatic reformatting. *Qmodem SST*'s remote mode matches rival *ProComm Plus*'s.

On line, you get keyboard macros, a chat mode, and a top-notch file transfer status screen, but the list of transfer protocols is mediocre, lacking Kermit, ZMODEM, or CompuServe-B. Fortunately, you can download these protocols from a BBS and add them. Terminal emulations are limited to ANSI and VT 100.

The script language is similar to *ProComm Plus*'s, and the learn mode is the best in the roundup. You can start recording a script from the dialing directory and automatically link it with an entry.

Qmodem SST's low price and easy operation make it a suitable alternative to *ProComm Plus*. But look elsewhere if you need a lot of emulations or protocols.



Mirror III 1.0

Mirror began its days as a cheap *Crosstalk XVI* clone, but this latest version leaves the old foe far behind. In fact, this edition rivals that other *Crosstalk*—the powerful *Mk.4*. For only $99.95, SoftKlone's *Mirror III* adds a dialing directory, data compression, background transfers, and a sophisticated script language. If not for a cumbersome on-line interface (and a sloppy manual that fails to mention the dialing directory), *Mirror III* might best *ProComm Plus* for top honors.

Mirror III suffers from SoftKlone's attempt to retain *Crosstalk* compatibility while moving toward a *ProComm* interface. The pop-up menus, hot keys, and context-sensitive help are competent, but when you exit some modules, you're dumped to a *Crosstalk XVI*–like status screen. On line, you must issue *Crosstalk* commands—no menus or hot keys are available.

The top-notch directory provides queue dialing and tagging, and as with *Qmodem*, you can add notes to entries and start the learn mode from the directory. The *WordStar*-style editor is better than most.

Mirror III supplies plenty of error-checking protocols and terminal emulations. Its data compressing protocol is efficient, and MNP compression is available as a $34.95 add-in. *Mirror III* also runs the fastest background transfers in the roundup.

But *Mirror III*'s remote mode is limited. There's no password security—your only protection is to prevent remote callers from tapping certain commands, such as exit to DOS. The host mode lacks menus, so callers must issue *Crosstalk* commands.

The program's powerful new PRISM script language is second only to *Mk.4*'s CASL, and it's easier to use. As with structured BASIC, you get plenty of advanced math and windowing commands, and you

Mirror III's dialing directory moves it a step away from Crosstalk and closer to the approach of popular shareware programs.

EXECUTIVE SUMMARY

Mirror III 1.0

Communications software

This *Crosstalk* clone has come a long way in a hurry. Corporate developers will like the PRISM script language, extensive terminal support, and background operations. Despite its forbidding on-line interface, it's also a good deal for casual users.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
File transfer				●
Terminal emulation				●
Session automation				●
Remote operations		●		
Multitasking			●	
Overall value			●	

Reader service no. 614

can encrypt scripts. PRISM lacks some of CASL's extras, but it lets you run *Crosstalk* scripts without modification, which you can't do with *Mk.4*. Debugging is automatic—the editor opens when you encounter a glitch.

Despite its bare-bones interface and disappointing manual, *Mirror III* is highly recommended. *Crosstalk* users can switch horses with their scripting skills intact, and corporate programmers can draw on PRISM, background operations, MNP transfers, and extensive terminal support.

Crosstalk Mk.4 1.1

With its heavy-duty CASL language, *Crosstalk Mk.4* is a good choice for corporate programmers who need to create custom applications. The $245 *Mk.4* provides the most extensive list of protocols and emulations in the roundup; and though it lacks background transfers, you can juggle up to 15 simultaneous sessions on Tymnet. The many bugs that marked *Mk.4*'s debut have been eradicated, and the manual is greatly improved. However, the interface is still needlessly complex. *Mk.4* bests *Relay Gold* and *Smartcom III* in the battle of the heavyweights, but most users will want an easier alternative.

Mk.4's interface consists of CASL-constructed menus tacked on to a *Crosstalk XVI*–like command mode. Unfortunately, the limited light-bar menus are poorly integrated with much of the program. You can use hot keys for some off-line tasks, but once on line you must choose between menus and CASL commands; and only about half the familiar *Crosstalk XVI* commands still work. On-line operations are further complicated by poor contextual help and the lack of a constant status line.

Mk.4 has no dialing directory to pull entries and parameters into one place. Instead, setup and dialing functions are spread across five menus, with parameters scattered in another eight. The built-in editor is adequate.

If you can endure the interface, *Mk. 4* delivers a bundle. It offers a wealth of protocols, including ZMODEM, YMODEM-G, and the speedy, proprietary Dart protocol.

Mk.4 excels at terminal emulation, with twice as many on-line disguises as its nearest rivals; its DEC emulations are the best in the roundup. The remote mode, however, is as limited as *Mirror III*'s.

Mk.4's complex CASL language, which holds its own as a stand-alone language, can help smooth the thorny interface. In fact, some CASL programmers have used it to develop a *ProComm*-like interface. Based loosely on BASIC and *Crosstalk*, CASL provides advanced windowing and math functions and a superb debugger.

EXECUTIVE SUMMARY

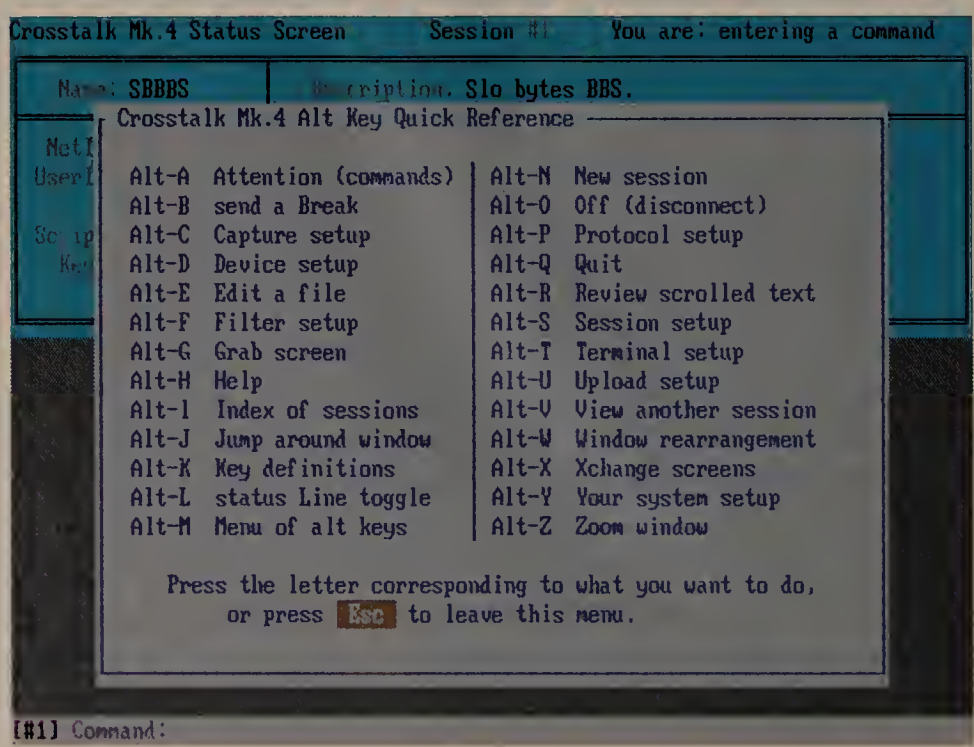
Crosstalk Mk.4 1.1

Communications software

The king of the heavyweights, Mk.4 has extensive terminal support, multiple sessions, and a powerful script language that nearly overcome its difficult interface. It's recommended for corporate departments supported by accomplished programmers.

	POOR	FAIR	GOOD	EXCELLENT
Messaging		●		
File transfer				●
Terminal emulation				●
Session automation				●
Remote operations		●		
Multitasking			●	
Overall value			●	

Reader service no. 612



Simple keystrokes can do a lot in Crosstalk Mk.4, but the program lacks hot keys for file transfers and other on-line tasks.

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BIOS	Phoenix	Phoenix	C & T	Phoenix
Norton SI Rating v 4.0	2.1	11.2	17.6	22.0
Wait State	0	0	0	0
Standard Memory	640K	512K	1MB	1MB
Shadow BIOS	—	—	—	384K
Memory Upgrades	—	1MB	1S/2/3/S/6/8MB	2/4/8/10/16MB
Coprocessor Support	8087	80287	80387SX	80287 or 80387
Expansion Slots: 32-bit	—	—	—	1
Expansion Slots: 16-bit	—	6	6	4
Expansion Slots: 8-bit	8	2	2	3
Dual HD/FD Controller	w/HD systems	Yes	Yes	Yes
Device Bays (Exposed/Internal)	2 Exp./2 Int.	3 Exp./2 Int.	3 Exp./1 Int.	3 Exp./2 Int.
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Circle 207 on reader service card

Crosstalk Mk.4 is recommended for programmers who need to automate complex communications chores. Casual users without a CASL guru handy should pass this powerhouse by.

Boyan 4.0

Like *Qmodem SST, Boyan 4.0* is a shareware program with a sweet, swift interface. Yet the $55 *Boyan* has some rough edges. There is no text editor or predefined scripts for major services, the script language is trying, and the "learn mode" is primitive. Even with the complete $65 package (which includes a printed manual), phone support isn't part of the deal. And like *Qmodem SST, Boyan* is short on terminal emulations and lacks background transfers. Still, the basic package is sound, offering numerous protocols, a slick file manager, context-sensitive help, and a competent manual.

Boyan opens with a lucid, *ProComm*-like dialing directory. <Alt>-*key* combinations summon pop-up menus. If a call doesn't connect, *Boyan* adds the phone number to the queue and tries later.

Boyan delivers 12 protocols, including ZMODEM, and its remote host mode rivals *ProComm Plus*'s. However, *Boyan* emulates only VT 52 and VT 100 terminals. *Boyan*'s script language is as powerful as *ProComm Plus*'s, but the cryptic syntax will put off most users. Worse, there's no true learn mode. You must scroll back through the autocapture buffer and pick out the prompts and responses to build a log-on script.

Boyan's file manager is the best in the roundup; you can copy, delete, edit, execute, and even upload a file. Other extras include keyboard remapping and keyboard macros that can execute scripts.

Boyan can't match *Qmodem SST*, but it's still a pretty good deal. With a little spit and polish, *Boyan* could be a contender.

EXECUTIVE SUMMARY

Boyan 4.0

Communications software

Boyan 4.0 delivers good dialing features in a low-cost shareware package, but it lacks polish. The DOS shell is appealing, but the program is weak on emulations and other basics.

	POOR	FAIR	GOOD	EXCELLENT
Messaging				●
File transfer				●
Terminal emulation	●			
Session automation			●	
Remote operations				●
Multitasking	●			
Overall value		●		

Reader service no. 610

Smartcom III 1.1a

Hayes's $249 *Smartcom III* has plenty of sophisticated features, but you have to slog through a baffling interface to reach them. You get extras like data compression and multiple sessions, but terminal emulations are limited. Also, the program wouldn't work with a few Hayes-compatible modems such as Practical Peripherals' 2400SA.

The polished menu- and prompt-driven interface appears friendly at first, but with no hot keys, you soon tire of menu hopping—changing protocols on line takes 13 key-

EXECUTIVE SUMMARY

Smartcom III 1.1a

Communications software

Smartcom III's polished features are offset by a confusing interface and a mediocre list of emulations. Make sure your non-Hayes modem is compatible before you buy.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
File transfer			●	
Terminal emulation	●			
Session automation			●	
Remote operations			●	
Multitasking			●	
Overall value		●		

Reader service no. 618

Like Qmodem SST, Boyan 4.0 is a shareware program with a sweet, swift interface.

strokes. Worse, setting up entries is a bear. Lacking a unified dialing directory, *Smartcom III* stores modem parameters in a Connection menu system and emulations and filtering settings in a separate Activity menu system. The idea is to save time by sharing one connection with several activities. Unfortunately, remembering which parameters are stored in which menu is difficult.

Still, *Smartcom III* delivers some excellent features. The auto-capture buffer is the best in the roundup, the text editor is second only to *Qmodem SST*'s, and the superb file manager nearly equals *Boyan*'s. The remote mode is good, and you get an ample choice of error-correction protocols. You can choose to compress and/or encrypt files for use with any protocol. Compressed files transfer quickly on Hayes V-series modems but are slower than *Mirror III*'s and *Relay Gold*'s on standard Hayes modems. Version 1.1 adds the ability to run two simultaneous sessions on a pair of modems or four sessions on a Hayes V-series X.25 modem (eight sessions if you have two X.25 modems).

On the downside, you're limited to ANSI and VT 100/102/52 emulations. Due to *Smartcom III*'s 512K overhead, background transfers work only with small applications, and the feature is poorly documented.

Smartcom III's SCOPE language almost rivals *Mk.4*'s CASL, offering windowing, a trace mode, and conditional branching and labels. SCOPE's syntax is unconventional, but a helpful script editor lets you select commands from a menu.

Smartcom III provides some unique extras. But its confusing interface, paltry emulations, and incompatibility with some non-Hayes modems hinder its appeal.

Relay Gold's main strength is its links to IBM 3270 and VM systems running Relay.

Relay Gold 3.0

Like *Mk.4*, *Relay Gold* is aimed squarely at corporate users. Advanced features include efficient data compression and background transfers, a highfalutin script language, and 15 multiple sessions via Tymnet. However, the $295 price is steep, there are few error-checking protocols, and remote access is limited to other *Relay* users. It's an obvious choice for linking up with IBM mainframes that also run *Relay*, but most users should look elsewhere.

Relay Gold opens with a well-designed function-key menu, but there are no hot keys. You get a central dialing directory, but to add a new entry, you must copy and edit an existing one. The command-driven text editor is difficult to use and lacks word wrap.

File transfer options are limited to Kermit and XMODEM—you don't even get YMODEM-G. However, if you communicate with another *Relay* user (and that's the idea), you can tap the company's proprietary data-compressing protocol. Background transfers are easy—with *Relay Gold*'s slim 192K RAM overhead, there's plenty of room for other applications.

Relay Gold's main strength is its links to IBM 3270 and VM systems running *Relay*. When you dial in, you're logged on smoothly and welcomed with familiar menus. *Relay Gold*'s support for 3270 emulation boards is unique to the roundup, but other emulations are limited to VT 100/102/52 and IBM 3101.

The script language supplies near-CASL-like power, but its structure and syntax are quirky. BBS fans take note: The learn mode works only with TTY emulation, so you'll have to hand-tailor ANSI-based scripts.

EXECUTIVE SUMMARY

Relay Gold 3.0

Communications software

Relay Gold is a must for *Relay* mainframe environments, and extras such as data compression and background transfers will draw other users. However, the program's high price, skimpy list of protocols, and limited remote made hinder its appeal.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
File transfer		●		
Terminal emulation		●		
Session automation			●	
Remote operations		●		
Multitasking				●
Overall value		●		

Reader service no. 617

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Relay Gold is the best bet for corporations that link up to IBM mainframes. Beyond this turf, however, it can't compete.

Crosstalk XVI 3.7

Crosstalk XVI's continuing popularity is something of a mystery, since its dated features make it an ill-advised choice. The tenacious veteran still lacks menus and dialing directories, and there's no learn mode or text editor. Even die-hard *Crosstalk* users should consider switching to *Mirror III*.

Totally command-driven, *Crosstalk XVI* can be an effective tool once you master its two-character commands. The *Crosstalk* language doesn't match up to *ProComm Plus*'s, but at least it includes a debugger.

Protocols are few, and the proprietary protocol was the slowest in the roundup. Remote options are just as primitive as *Mirror III*'s. Although *XVI* lacks an editor, you can call other word processors.

Version 3.7's new background mode is a mixed bag. Foreground operations zip along, but background transfers drag and often crash. *Crosstalk XVI*'s lack of advanced features might be forgiven—but not with its $195 price tag and crude interface.

EXECUTIVE SUMMARY

Crosstalk XVI 3.7

Communications software

The latest version of the classic *Crosstalk* locks the features necessary to compete with programs like *ProComm Plus*. The new background transfer feature can't make up for the lack of menus and other basics.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
File transfer		●		
Terminal emulation			●	
Session automation			●	
Remote operations			●	
Multitasking			●	
Overall value			●	

Reader service no. 611

EXECUTIVE SUMMARY

Freeway Advanced 3.0

Communications software

Freeway Advanced 3.0 can't compete on the feature list, and it's crippled by a crude interface and incomplete documentation.

	POOR	FAIR	GOOD	EXCELLENT
Messaging		●		
File transfer			●	
Terminal emulation	●			
Session automation	●			
Remote operations	●			
Multitasking	●			
Overall value	●			

Reader service no. 613

Freeway Advanced 3.0

Kortek's $139 *Freeway Advanced 3.0* is advanced in name only. It lacks macros and predefined scripts, and emulations and remote options are limited. These foibles could be tolerated if not for the tedious, multilayered menu interface. You can bypass the menus and issue *Crosstalk* commands, but users seeking an easy switch from *Crosstalk XVI* should look to *Mirror III* instead.

Freeway's buggy installation utility forces you to copy files manually, and the sketchy documentation is baffling. For example, you're told to press <F8> and <F9> to enter command mode, but only <Ctrl>-<Shift>-X does the job.

Freeway Advanced is menu-driven to a fault, overwhelming you with a barrage of light-bar and pulldown menus. The program lacks hot keys in off-line mode, so even simple tasks require that you plow through layers of windows. Fortunately, once you're on line, you can use <Alt>-*key* commands.

You divvy up phone numbers into nine password-protected directories, but each holds only 12 entries, and you can't copy entries between directories. Calls can't be queued, but a built-in timer lets you start calls automatically. *Freeway*'s list of file protocols is extensive, but its editor is the weakest in the roundup—you can't edit *Crosstalk* scripts or save and load ASCII files.

If you're looking for effective communications, avoid a clumsy interface.

Freeway Advanced's background mode is slow. The remote mode is limited to other *Freeway* users, offers only one level of password security, and bars callers from DOS.

To create a script, you must choose between two poorly documented languages. You must use the cryptic Autopilot to edit scripts recorded in the learn mode, but you have to use *Crosstalk* syntax to create scripts from scratch. The learn mode scripts often crash because they rely on simple pauses instead of waiting for on-screen responses. Note: Many *Crosstalk XVI* scripts won't run without modification.

With its limited features and awkward interface, *Freeway Advanced* fails to live up to its name.

Power to the Small Fry

If you're looking for effective communications, avoid a clumsy interface. With this maxim in mind, *ProComm Plus* wins a Best Buy by delivering a heap of features in an easy-to-use package, and *Qmodem SST* comes close with a lower-cost package. *Mirror III* and *Crosstalk Mk.4* deliver the greater power, but *ProComm Plus* offers the best balance. *Boyan*, *Smartcom III*, and *Relay Gold* are worth a look for users with specific needs; *Crosstalk XVI* and *Freeway Advanced* aren't recommended.

The gap between low-cost, easy-to-use communications packages and heavyweight titans is closing fast. Most users are better off taking the easy way out. ●

George Campbell is a freelance writer who operates a busy BBS.

For more information about all products in this article, circle reader service no. 902.

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Crosstalk XVI 3.7
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Roswell, GA 30076
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404/998-8048 (BBS)
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TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–6
OTHER SUPPORT: compony BBS, CompuServe forum (GO XTALK)
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Crosstalk Mk. 4 1.1
DCA/Crosstolk Communicotions
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Freeway Advanced 3.0
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800/327-0310,
415/327-4555
LIST PRICE: $139
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TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–7
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Smartcom III 1.1a
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P.O. Box 105203
Atlonto, GA 30348
404/441-1617,
800/874-2937 (BBS)
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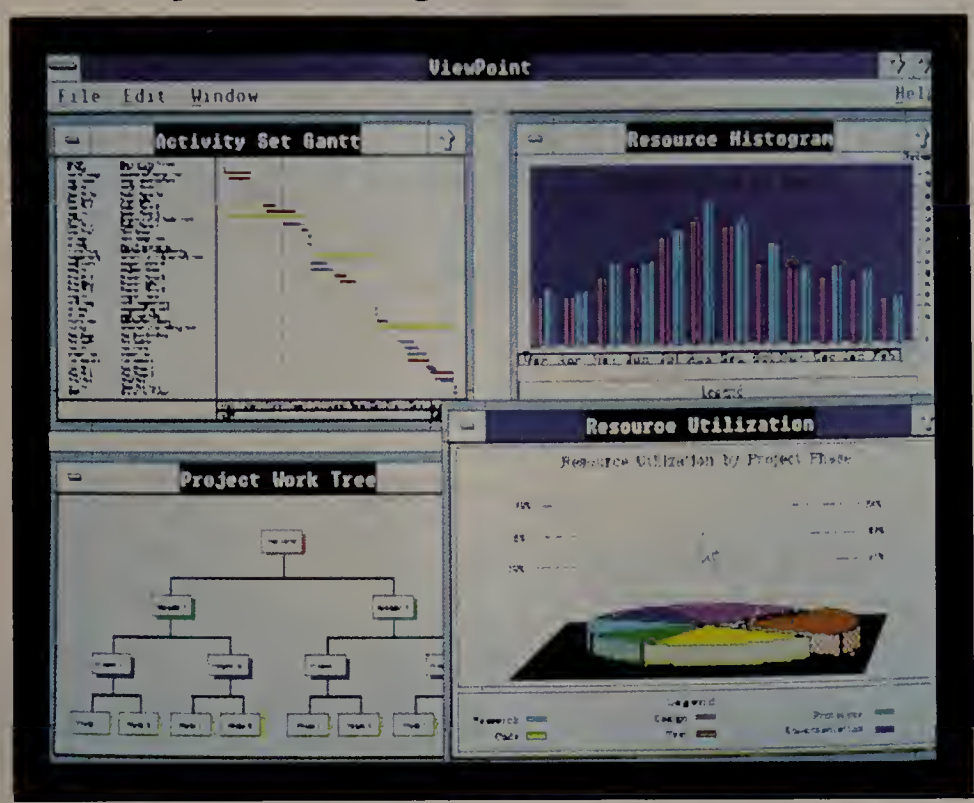

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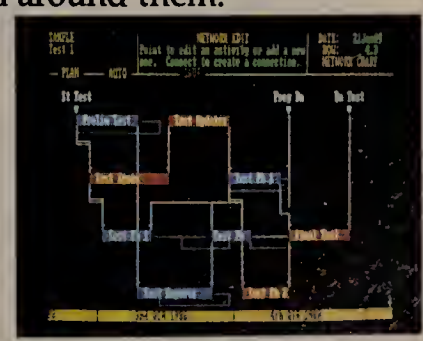

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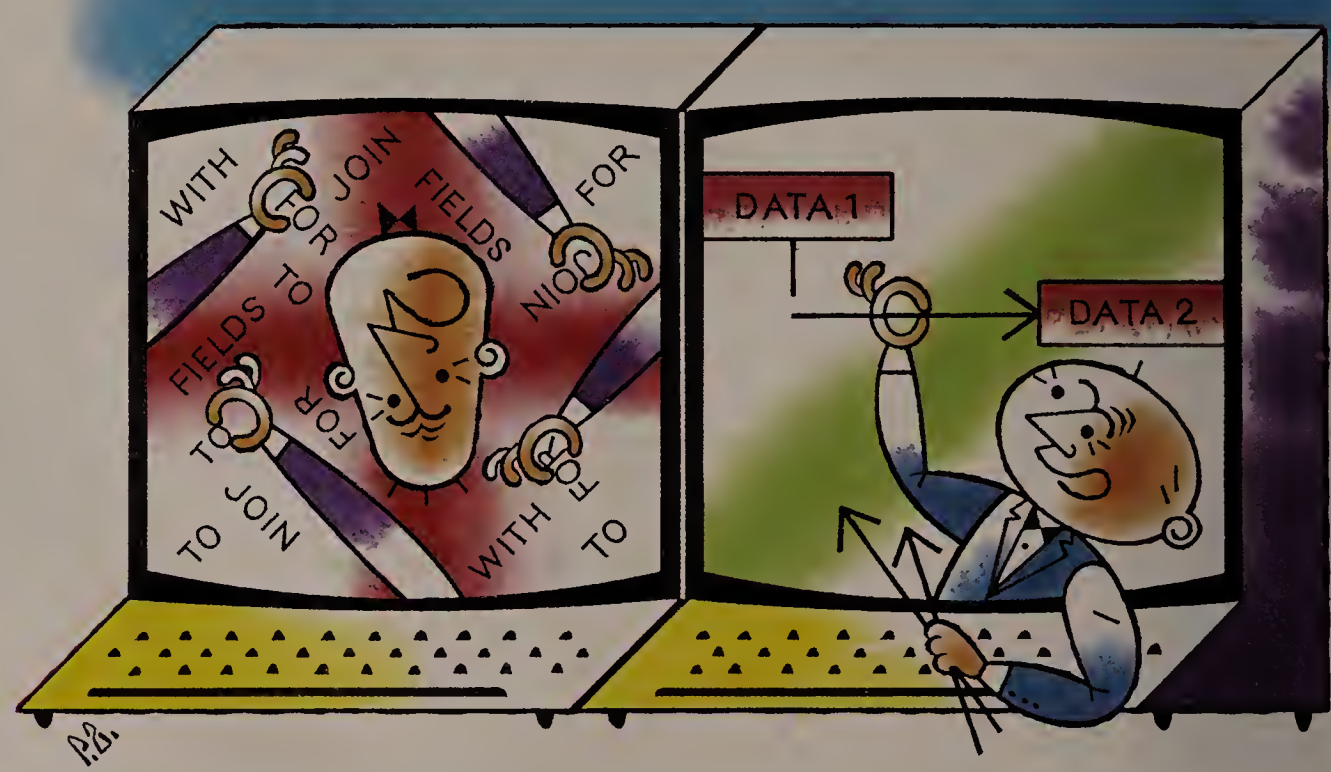


Scott D. Palmer

When it came out with *Alpha/three*, Alpha Software gave nonprogrammers an elegant, easy-to-use data base manager that adopted the *dBASE* file format as its own. *Alpha Four* doesn't conform to all the characteristics that experts consider essential in a fully relational data base, but the new program does include relational features that deftly enable multifile data entry and reporting. Users also get unparalleled ease in creating custom menu systems. The program improves on *Alpha/three*'s data validation, maintains multiple indexes for each data file, and offers fast, simplified searching.

In capacity, *Alpha Four* is a far cry from *Alpha/three.* It can handle 2 billion records per data base (up from 65,536) and allows 128 fields per record and 256 characters per field. Each data base can be associated with an unlimited number of lookup data bases, and lookup tables have grown to 255 rows from 128. You can now have seven index files (up from five), which are updated automatically when you add new records. Index files let you display records sorted on a field without having to do a time-consuming sort operation, so you can search, view, and print any record in any data base almost instantly.

However, *Alpha Four* lacks mouse support and strong macro capabilities, and the program is still quite slow. Moreover, at $549 *Alpha Four* is relatively expensive: *Q&A* costs $389; *Professional File,* $299.

Entering Data the Easy Way

You create a data file in *Alpha Four* the same way as in *dBASE,* by entering a field's name, type, and length in response to on-screen prompts. More sophisticated features, such as calculations, multifile links, and data entry validation, are accessible through *Alpha Four*'s extensive field rules menu. For example, if you want to limit discounts to just your best customers, you can use a field rule to display a zero in the Discount field automatically when the value in the Quantity field is less than 100.

You can enter and edit records in single-record or table view. If you're viewing a table of records and want to change the field on which they're sorted, just pop up a list of available index files and pick a new one. About the only data entry feature missing from *Alpha Four* is the ability to split the screen into windows, a capability found, for instance, in Borland's *Reflex* (see *Product Outlook* in this issue).

FEATURES EVALUATION

Alpha Four: Flashy Features and Easy to Use

In addition to its new multifile talents, Alpha Four boasts significantly better capacity and reporting than Alpha/three.

● Yes
○ No
◒ Deficient

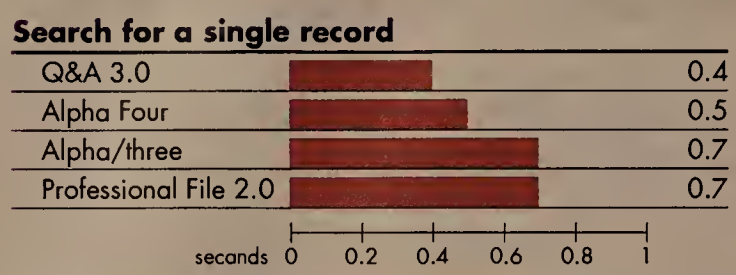
	Alpha Four	Alpha/three	Professional File 2.0	Q&A 3.0
Data entry, editing, and validation				
Calculated fields	●	●	●	●
Date/time fields	◒[1]	◒[1]	●	●
User-customized screens	●	●	●	●
Global record update/deletion	●	●	●	●
Validates via lookup table	●	●	●	●
Checks for valid data range	●	●	●	●
Allows blank fields	●	●	●	●
Maximum data entry screens	10	7	32	10
Searching and sorting				
Searches/sorts on nonindexed fields	◒[2]	◒[2]	●	●
Searches/sorts on multiple fields	●	●	●	●
Searches/sorts macros	○	○	●	●
Case-sensitive searches	●	●	○	○
Boolean/compound-Boolean searches	●	●	●	●
Reporting				
Saves report formats	●	●	●	●
Date stamping	●	●	●	●
Mailing label formats	●	●	●	●
Headers/footers	●	●	●	●
Forced page breaks	●	●	●	●
User-defined formats	●	●	●	●
Default formats	◒[3]	◒[3]	●	○
Capacity				
RAM requirements	512K	320K	384K	512K
Maximum file size	4GB	262MB	8MB	256MB
Maximum records per file	2 billion	65,535	59,000	16 million
Maximum fields per record	128	128	3200	2182
Maximum record size	4K	4K	56.3K	16.7K
Maximum text field size	5K	5K	.25K[4]	1.67K
Reads/writes DIF	●	●	○	●
Reads/writes ASCII	●	●	●	●

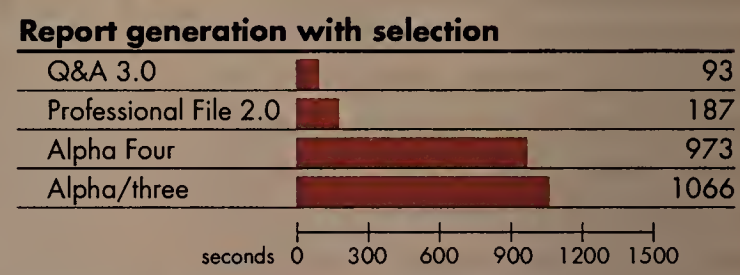
[1] Date fields only.
[2] Searches only.
[3] Browse tables only.
[4] Maximum size is actually 255 characters.

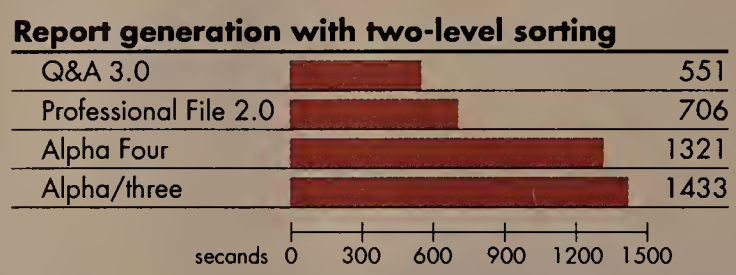
NSTL TEST REPORT

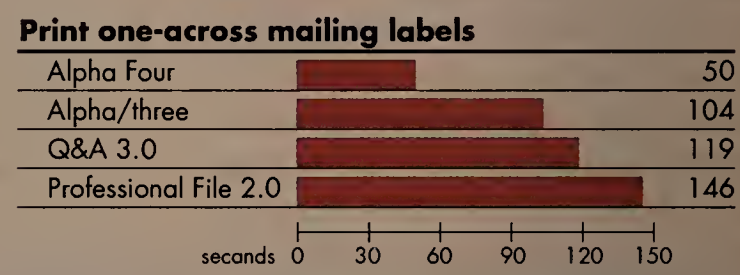
Alpha Four: Better, but Still Slow

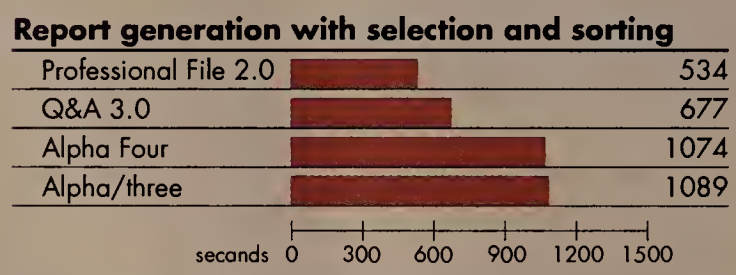
Alpha Software's new data base manager has some sterling virtues, but unless it's printing mailing labels, speed isn't among them.

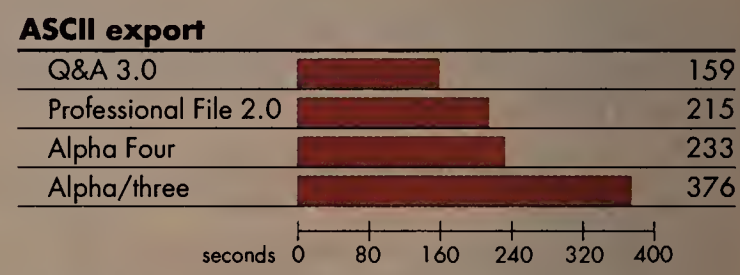












Methodology
All benchmarks were performed on on 8-MHz IBM PC AT with 640K of RAM and a 30MB hard disk. Testing was timed from the last keystroke of the command sequence until control was returned to the user.

Search for a single record
This test measures the time required to search for a single record in a 5000-record inventory file, using the fastest type of search the program allowed.

Report generation with two-level sorting
This test measures the time required to sort the inventory file using the price field as the primary key and the part number field as the secondary key, and to print the report consisting of 4 fields to a null printer (a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement).

Report generation with selection and sorting
This test measures the time required to sort the inventory file on the price field, select 2585 records with price > 5300, and print the report consisting of 10 fields to a null printer.

Report generation with selection
This test measures the time required to sort the inventory file on the price field, select 526 records with price > 5105 and part # > 104000, and print the report consisting of 10 fields to a null printer.

Print one-across mailing labels
This test measures the time required to print to a null printer mailing labels consisting of 3 fields. The fields were taken from 1000 records that were ordered by part number.

ASCII export
This test measures the time required to select 1000 records from a 5000-record data base and export them into a standard ASCII text file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

Sets and Menus

Alpha Four's biggest new feature is its ability to create a "set" of up to ten linked data files, enabling you to generate multifile reports almost as easily as single-file ones. *Alpha Four* uses index files to link the common fields of the data bases in a relational set.

Visually, *Alpha Four* is a delight. For example, a tree display shows all your linked files; to add a link to a file, you simply move the highlight to the parent file in the link and press <Enter>; you'll be prompted with a list of possible child files. In *Q&A*, by contrast, you must create sets of linked data files one at a time, setting up link formulas in calculated fields.

Alpha Four's second major attribute is the ease with which it lets you create menus for custom data entry forms, predefined report formats, and so forth. You can include multi-

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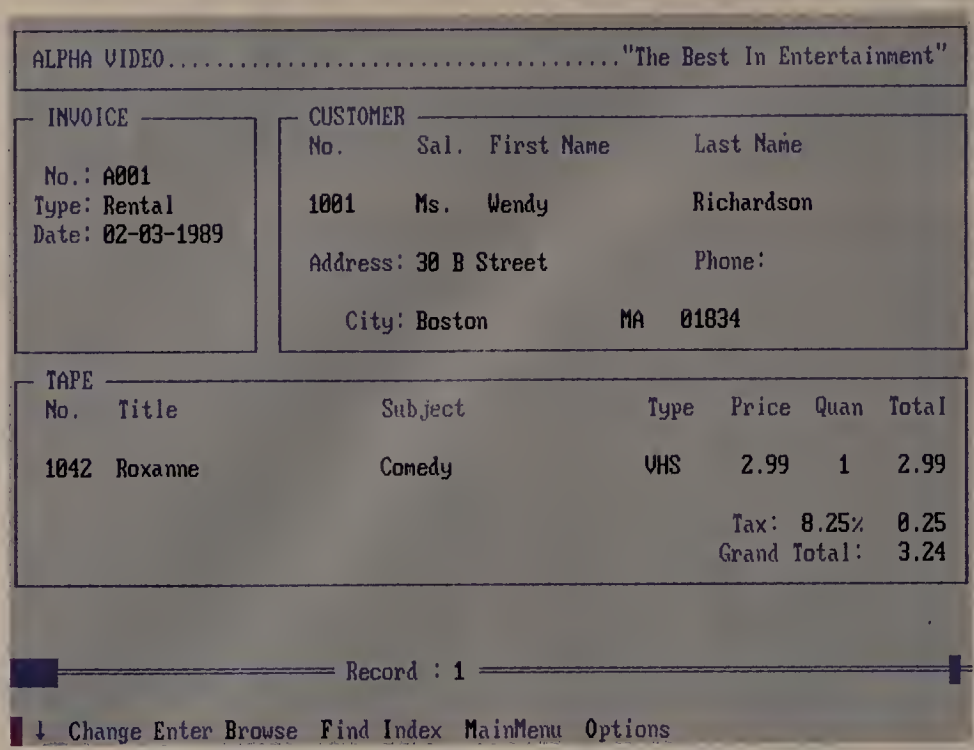

Alpha Four makes it easy to create customized menus, complete with pop-up help screens.

ple columns, password protection, and pop-up help.

Though the menu creation capability doesn't match that of a programmable data base, it surpasses what *Q&A* has to offer. With *Q&A* you can modify only existing menus, but *Alpha Four* lets you create completely new menu systems.

Shining Reports and Form Letters

As with everything else in *Alpha Four*, you use the point-and-shoot method to create reports. Both "quick" and "custom" report formats are offered; in either, the screen is divided into the various sections of the report—titles, headers, detail, and so forth. You can now have 128 calculated fields in a report with 9 levels of grouping, and use *Alpha Four*'s "multi-pass" report feature to precalculate totals before printing begins.

Generating form letters is just as easy, and remarkably flexible. *Alpha Four* can insert an external ASCII file in a letter, and you can embed IF...THEN logic to customize form letters for individual recipients. You could insert a dunning paragraph, for example, when a customer's balance was past due.

A Data Base for the Rest of Us

The main quality that stands out about *Alpha Four* is how wonderfully easy it is to learn and use. Even such data base operations as creating multifile reports are a matter of menu choices. *Alpha Four* is intended for people who deal with dBASE-format files or generate custom interfaces for other users but don't need a built-in programming language like dBASE or Paradox. *Alpha Four* isn't fast, and it's relatively expensive. But its enhancements are significant, and dBASE shops especially will cheer its arrival. ●

Scott D. Palmer is the editor in chief at Omnicom Inc., a publisher of newsletters and studies on computer communications technology in Vienna, Virginia.

EXECUTIVE SUMMARY

Alpha Four

Data manager

Alpha Four is an easy-to-use data manager with flexible data entry and multifile reporting. It uses the *dBASE* file format and lets users create custom menu systems easily. This version is faster than *Alpha/three* but generally slower than competing products.

	POOR	FAIR	GOOD	EXCELLENT
Data entry				●
Searching and sorting			●	
Reporting				●
Capacity				●
Performance		●		
Overall value			●	

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WHERE TO BUY

Alpha Four
Alpha Software, Inc.
1 North Ave.
Burlington, MA 01803
617/229-2924, 617/229-2915
LIST PRICE: $549
REQUIREMENTS: 512K (640K recommended), hard disk, DOS 2.2 or later version
TECHNICAL SUPPORT: free for 60 days after receipt of registration card, no toll-free number, M–F 9:30–5; extended support (includes toll-free number and quarterly newsletter) 10 calls in six months $59, 25 calls in one year $99
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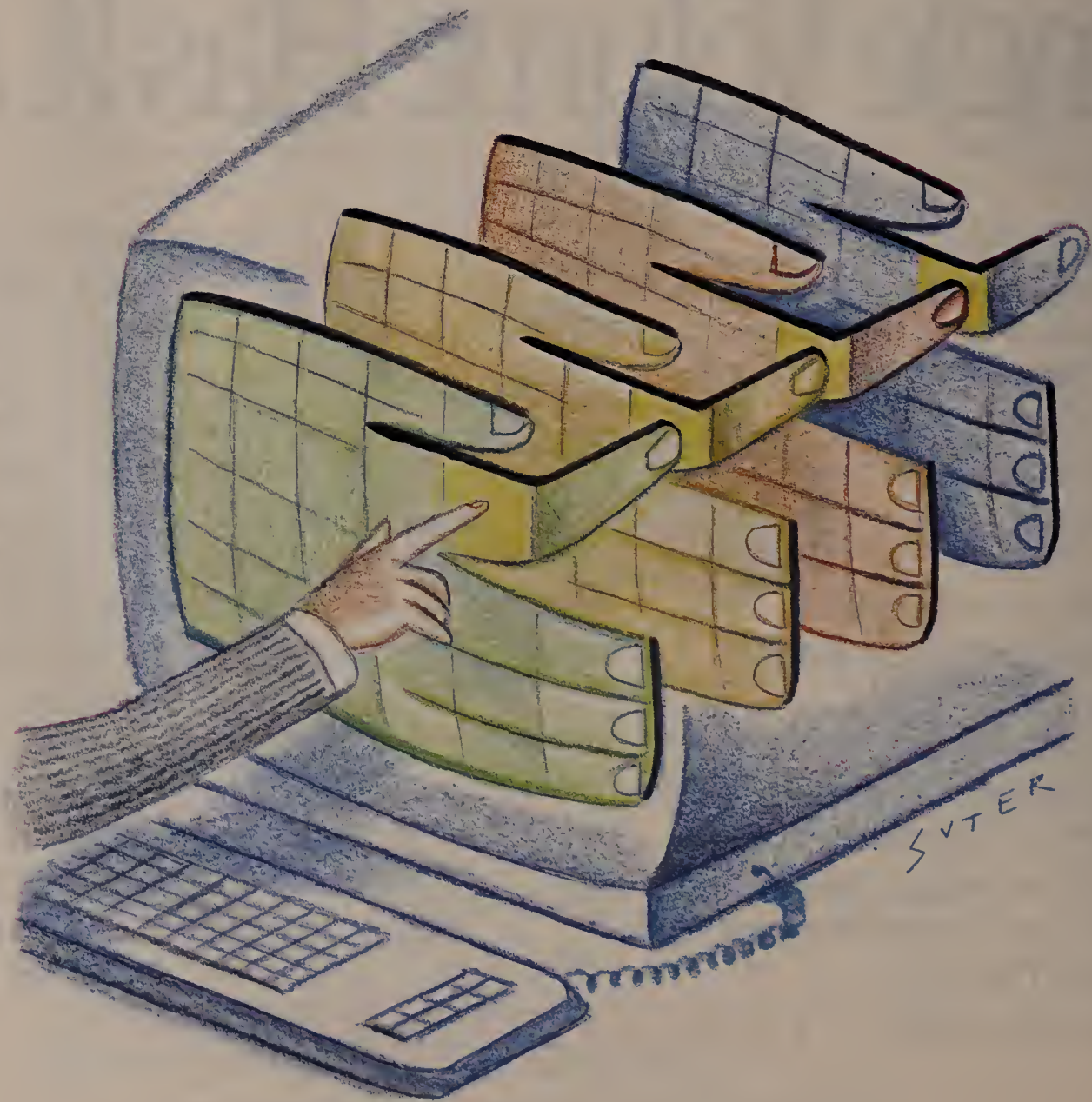
SuperCalc5: A Giant in 1-2-3's Shadow

Amid all the furor over 1-2-3, Computer Associates has shipped a beefy SuperCalc5. It's no speedster, but it has worksheet linking and nifty graphics.



Scott D. Palmer

If the folks at Computer Associates are feeling a bit miffed, they should be forgiven. *SuperCalc5* shipped in February and offers a slew of advanced features, yet at press time, the spreadsheet world was talking of little besides the split-level upgrade of *1-2-3* (see the *1-2-3* preview, *PCW*, May 1989).

That's too bad, because the number of new features in *SuperCalc5* is impressive, particularly in data entry and editing. It offers linked and multipage worksheets, minimal recalculation, expanded searching, an undo command, and better file format support. In addition to handling *1-2-3* files, for example, *SuperCalc5* now reads and writes *dBASE* files.

But this power comes at a price. In NSTL tests, *SuperCalc5* was pretty sluggish. And while Computer Associates claims *SuperCalc5* can run on a standard PC, the program's lethargy and big RAM appetite make that claim dubious. The full program uses about 440K of memory, compared to 317K for *Quattro* and 214K for *1-2-3* release 2.01, though you can save about 65K by disabling the graphics module, minimal recalc, and undo. To handle large worksheets, you really need expanded memory. (The program automatically recognizes up to 32MB of expanded memory.)

Forging Worksheet Links

SuperCalc5's most convenient new feature is its ability to create worksheet links. It can link external worksheets, like *1-2-3* release 2.2 and *Excel*, and also creates links within a worksheet, like *1-2-3* release 3.0.

If you have a summary file for monthly sales, for example, you can use *SuperCalc5*'s link capability to derive the total sales from a separate worksheet that contains individual sales records. When you load the summary file, *SuperCalc5* looks for the linked file —in RAM or on disk—and gets updated information.

DAVID SUTER

FEATURES EVALUATION

SuperCalc5 Leaps Forward

SuperCalc5 beefs up its features, particularly in data entry and editing.

● Yes
○ No
◒ Deficient
△ Limited only by available RAM

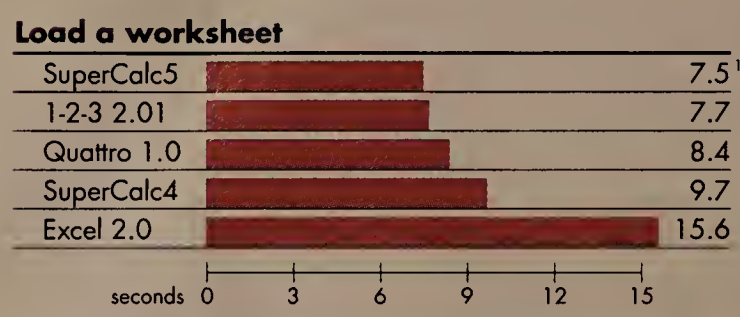
	SuperCalc5	SuperCalc4	1-2-3 2.01	Quattro 1.0	Excel 2.0
Data entry and editing					
Reads/writes .WKS and .WK1	●	●	●	●	●
Reads/writes .DBF	●	○	○	●	●
Undo command	●	○	◒[1]	●	●
Global search and replace	●	○	○	●	●
Wild-card searches	●	○	●	○	●
Underlining/boldface in cells	●	○	○	◒[2]	●
Background recalculation	○	○	○	○	●
Minimal recalculation	●	○	●	●	●
Password protection	●	○	●	●	●
Supports mouse	○	○	○	●	●
Capacity					
Maximum number of rows	9999	9999	8192	8192	16,384
Maximum number of columns	255	255	256	256	256
Maximum number of windows per screen	6	2	2	2	△
Maximum number of keys sorted concurrently	3	2	2	5	3
Supports expanded memory	●	●	●	●	●
Supports linked worksheets	●	○	◒[1]	○	●
Reporting and graphs					
Maximum report width (characters)	255	255	240	240	14 in.
Number of graph types	9	6	5	10	8
Number of graph colors	71	101	7	16	624
Prints sideways	◒[3]	◒[3]	○	◒[4]	●
Spooler	○	○	○	○	●
Macro/programming					
Macro libraries	●	●	○	○	●
Macro learn mode	●	●	◒[1]	●	●
Creates macro transcript files	●	●	○	●	●
Input statements	●	●	●	●	●
Step mode	●	○	●	●	●
DOS access from macro procedure	●	○	○	●	●
Reads/writes 1-2-3 macros	●	○	●	●	◒[5]

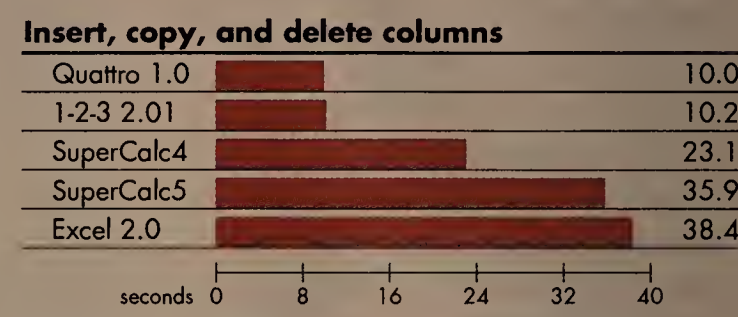
[1] With Lotus's HAL.
[2] With monochrome monitors only.
[3] With included Sideways program.
[4] With included Twist and Shout program.
[5] Read only, with included macro converter.

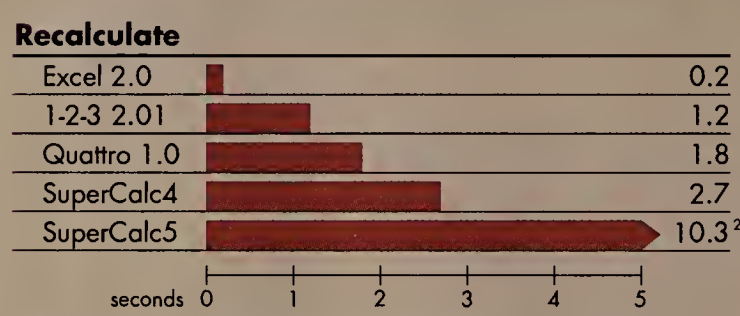
NSTL TEST REPORT

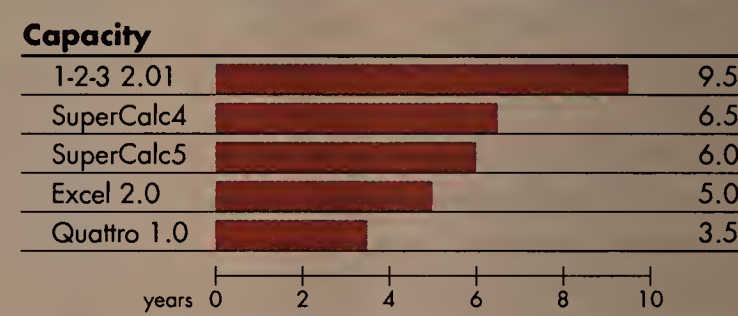
SuperCalc5: Slower With Age

Though it can load a file fast, SuperCalc5 is much slower than 1-2-3, Quattro, and even SuperCalc4 on recalc and column-move tests.









[1] With minimal recalc disabled. Otherwise, initial load time slows to 17.5 seconds.
[2] For the first recalc. Subsequent recalcs on this test averaged 4.7 seconds.

Methodology
Benchmarks were performed on a 12-MHz Compaq Deskpro 286 with 640K of RAM and a 40MB hard disk. Tests were performed using a worksheet containing a three-year business plan.

Load a worksheet
This test measured how long it took to load the test worksheet.

Recalculate
This test measured how long it took the spreadsheet to recalculate after a new value was entered into cell B18 (Sales).

Insert, copy, and delete columns
This test measured the time required to insert blank columns (P1..AD195), copy other columns into the new columns (AE1..AR195 to P1..AD195), and then delete the copied columns. Each step was timed separately; then the times were added.

Capacity
This test measured worksheet capacity by counting how many additional years' worth of data could be added to the worksheet. If an entire year could not be added, an attempt was made to add six months.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

Multipage spreadsheets also help make sense of your data. For example, you can have projected revenue figures on the first page of a worksheet, actual revenues on the second, and a summary on the third. With links between pages, you simply give the linked cell's page number instead of naming a different worksheet. You can link up to 255 worksheet pages, independent worksheets, or a combination of the two, though each link costs as much as 15K of RAM.

Improvements All Over

Compared to *SuperCalc4*, this new version is decidedly muscular. Computer Associates has incorporated and enhanced its stand-alone programs *Spreadsheet Auditor* and *Macro Analyzer*, so you can catch errors in your worksheet or even in macros. You can look at the relationships between cells, find formulas that refer to incorrect or empty cells, and get a map of your worksheet. And where *SuperCalc4* lacked data regression capabilities, *SuperCalc5* has them in spades. You can perform not only linear regression but quadratic and cubic as well, and you can have up to 87 independent variables—probably more than you'll ever need.

Likewise, *SuperCalc4*'s already solid graphics have become spectacular in *SuperCalc5*. You can create five types of bar and

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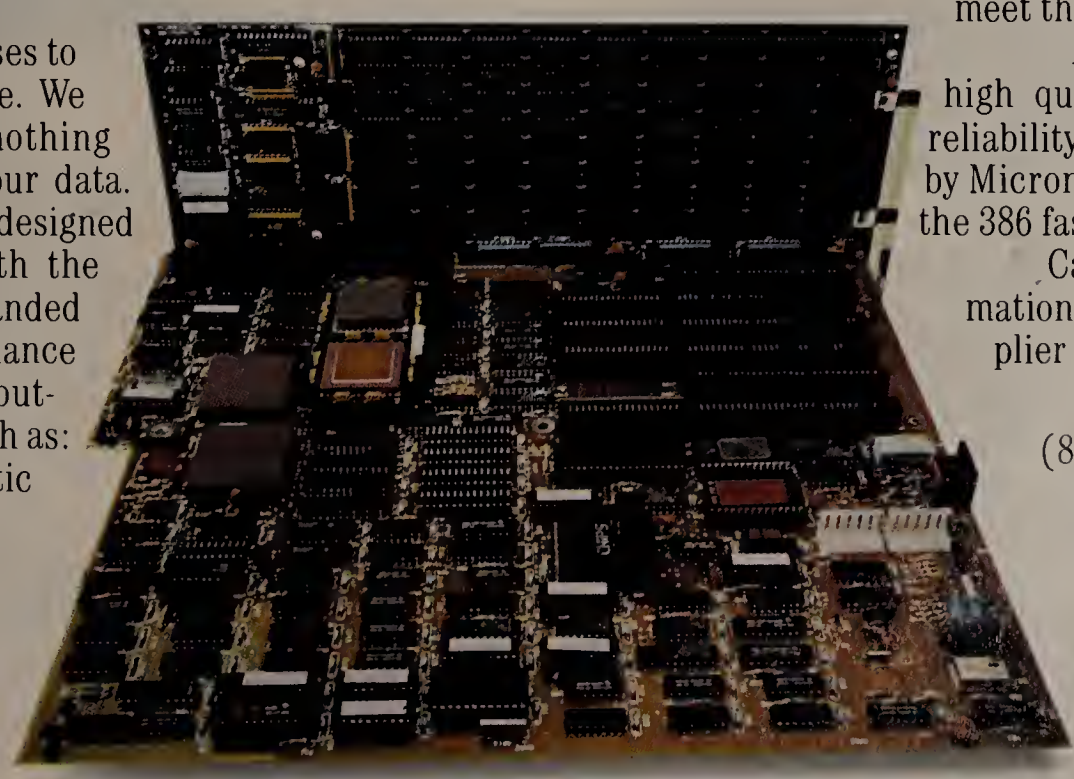

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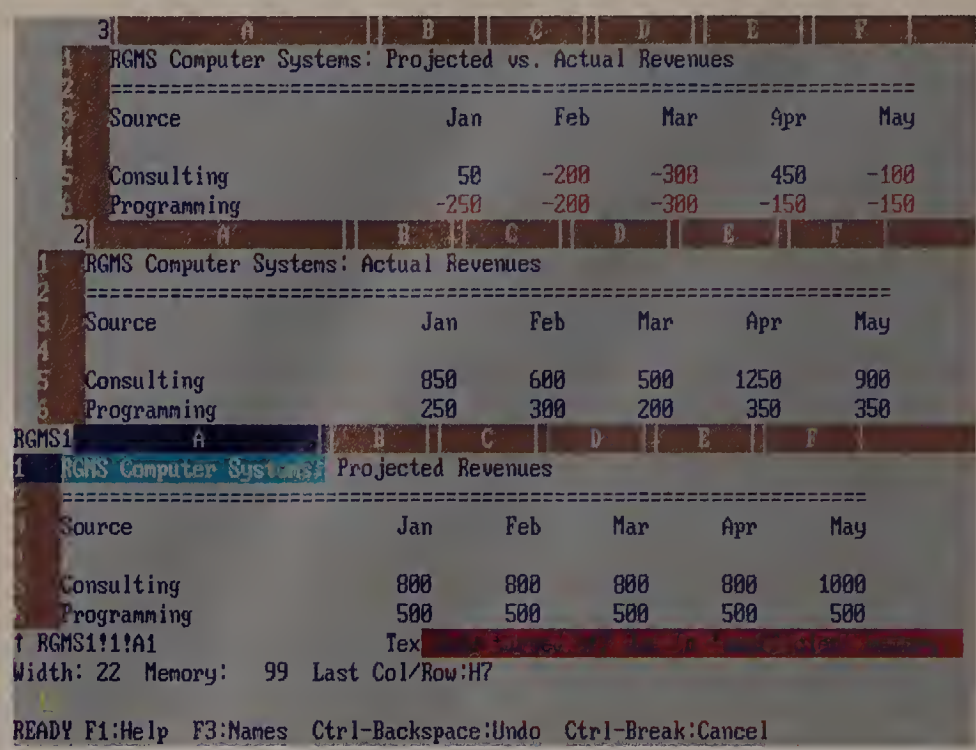

A SuperCalc5 multipage worksheet shows projected revenue figures on page 1, actual revenues on page 2, and a summary on page 3.

stacked-bar charts; two types of line and area graphs; and *x-y*, high/low/close, polar, word, pie, and exploded-pie charts. You can also display a 3-D pie chart on the left side of the screen and explode one slice into a bar chart on the right—something even *Quattro* can't do.

For a spreadsheet, *SuperCalc5*'s data management facilities are pretty good. You can sort or search for records that meet given criteria and even copy matching records to a different part of the worksheet. Need more? Computer Associates sells a $149 RAM-resident package called *Silverado* that adds relational data base features to *1-2-3;* at press time, the company was planning to release a version for *SuperCalc5* in November.

Report capabilities are impressive. In addition to the standard litany of multiple headers and footers, horizontal and vertical titles, and customizable borders, *SuperCalc5* supports reams of plotters and printers (including PostScript); it also produces slides. As before, the package includes Funk Software's *Sideways* for unbroken printouts of extra-wide spreadsheets.

When it comes to performance, *SuperCalc5*'s record is spotty. In NSTL tests, it beat *1-2-3 2.01*, *Quattro*, and *Microsoft Excel* in just one test—loading a worksheet—provided minimal recalc was disabled. On the recalculation and column-move tests, it was more than three times slower than *1-2-3*.

Overall, *SuperCalc5* serves up an attractive array of features. Its linked and multipage worksheets are great for reporting, and its 3-D graphs and charts are impressive. Finally, such data tools as auditing and data regression make *SuperCalc5* particularly appropriate for financial analysis and presentations. ●

Scott D. Palmer is the editor in chief at Omnicom Inc., a publisher of newsletters and studies on computer communications technology in Vienna, Virginia.

EXECUTIVE SUMMARY

SuperCalc5

Spreadsheet

SuperCalc5 links worksheets in RAM or on disk, supports multipage worksheets, and has impressive graphics. But it's slow compared to other spreadsheet packages.

	POOR	FAIR	GOOD	EXCELLENT
Data entry and editing			●	
Capacity			●	
Reporting and graphs				●
Macro/programming				●
Performance		●		
Overall value			●	

Reader service no. 620

WHERE TO BUY

SuperCalc5
Computer Associates Int'l
1240 McKay Dr.
San Jose, CA 95131
800/531-5236, 408/432-1727, 408/432-1764 (tech support)
LIST PRICE: $495, upgrade from previous version or competing spreadsheet $100
REQUIREMENTS: 512K (640K recommended), DOS 3.0 or later version
TECHNICAL SUPPORT: registered users only, no toll-free number, M–F 7–5; extended support (includes toll-free number, priority support, and unlimited technical help) $150 per year ($125 for first year if paid within 30 days of purchase)
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Reader service no. 620

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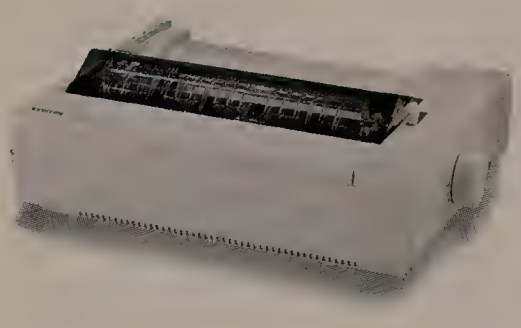
Alpha Software ... NCP
4103 ▣AlphaWorks 1.0 ..... 109.
5104 ▣ALPHA/four 1.0 ..... 319.



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Autodesk ... NCP
4519 □Autosketch 2.0 ..... 89.
Bible Research ... NCP
1464 □The Word 4.2 *(KJV or NIV)* ..... 159.
Bloc Publishing ... NCP
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4801 □PopDrop 3.1 ..... 32.
1447 □FormTool 2.01 ..... 55.
4594 □Form Filler 2.0 ..... 89.
Borland International ... NCP
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5335 ⒸTurbo Pascal 5.5 ..... 99.
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1514 ▣Paradox 3.0 ..... call
Bourbaki ... NCP
4524 □1DIR+ 3.02 ..... 49.
Bridgeway Publishing ... NCP
4386 □FastTrax 3.9 ..... 35.
Broderbund ... CP
1434 □Print Shop 2.41 ..... 39.
1433 ▣Memory Mate 3.01R *(NCP)* ..... 45.
Central Point ... NCP
5039 ▣PC Tools Deluxe 5.5 *(new version)* 79.
5038 □Copy II PC 5.0 ..... 27.
Chronos Software ... NCP
4387 ⒸWho•What•When 1.09 ..... 119.
Computer Associates ... NCP
4934 ▣SuperCalc 5 1.0 ..... 319.
Crosstalk Communications ... NCP
2911 □Remote² 1.1 ..... 95.
2908 □Crosstalk XVI 3.7 ..... 95.
2909 □Crosstalk MK.4 1.1 ..... 124.
Dac Software ... NCP
1754 □Dac Easy Light 1.0 ..... 45.
1756 □Dac Easy Payroll 3.0 ..... 59.
1748 □Dac Easy Accounting 3.0 ..... 59.
Data Storm ... NCP
4798 □PROCOMM PLUS 1.1B ..... 52.
Delrina Technology ... NCP
4325 ▣PerFORM 2.0 *(new version)* .... 179.
5th Generation ... NCP
3950 ▣Fastback Plus 2.09 ..... 109.
Fox Software ... NCP
2233 ⒸFoxbase Plus 2.1 *(single user)* .. 209.
Funk Software ... NCP
2228 □Sideways 3.21 ..... 42.
2229 ▣Worksheet Utilities 1.0 ..... 59.
4479 □Allways 1.0 ..... 85.
5157 ▣Allways for Symphony 1.0 ..... 85.
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4344 ⒸGeneric CADD Level 2 1.1 ..... 89.

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2265 ⒸGeneric CADD Level 3 1.1 ..... 179.
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4879 □Payroll 2.05 ..... 89.
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2324 ⒸPC Logo 3.0 ..... 59.
Hayes ... NCP
2293 ▣Smartcom II 3.0 ..... 89.
2295 ▣Smartcom III 1.0 ..... 149.
Hilgraeve Software ... NCP
2323 □HyperACCESS 3.31 ..... 89.
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2415 ▣Typing Instructor Encore 2.13 .... 19.
2408 □Professor DOS 2.51 ..... 27.
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2667 □Symphony 2.0 ..... 459.
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2798 □Managing Your Money 5.0 ..... 119.
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2775 □CarbonCopy Plus 5.0 *(2 req.)* ... 115.
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2968 □Tornado 1.8 ..... 55.
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2835 ▣R:BASE for DOS *(version 2.1)* ... 489.
5008 ▣R:BASE Compiler 1.0 ..... 629.
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2901 ☐Word 5.0 ..... 209.
2856 ▣Excel 2.1 *(req. 80286/80386)*... 239.
2891 ▣Project 4.0 ..... 329.

LANGUAGES
5188 ☐QuickPascal 1.0 ..... 49.
2894 ☐QuickBASIC 4.5..... 69.
2895 ☐QuickC 2.01 with Assembler .... 69.
2880 ▣Macro Assembler 5.1..... 99.
2847 ▣Basic Compiler 6.0 ..... 199.
2859 ▣Fortran Compiler 5.0 ..... 289.
2853 ▣C Compiler 5.1 ..... 299.

Monogram ... NCP
2778 ▣Dollars and Sense 3.1 ..... 105.

Multisoft ... NCP
4924 ☐Super PC-Kwik 3.2 ..... 49.
4925 ☐PC-Kwik Power Pak 1.3 ..... 79.

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2970 ▣Clipper *(Summer '87)* ..... 429.

New England Software ... NCP
3004 ▣Graph-in-the-Box 2.2..... 75.
4337 ☐GB-Stat 1.5 ..... 159.
4336 ▣GB Analytic 1.0 ..... 105.

Nolo Press ... NCP
2982 ☐WillMaker 3.0..... 35.
5122 ☐For The Record 1.0 ..... 35.

North Edge Software ... NCP
2987 ☐Timeslips III 3.3 ..... 169.

Norton-Lambert ... NCP
4928 ☐Close-Up Customer 3.0 ..... 135.
4929 ☐Close-Up Support 3.0 ..... 165.

Owl International ... NCP
3080 ☐Guide 2.0..... 143.

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3142 ☐VP-Planner Plus 2.0 ..... 145.
3138 ☐VP-Expert 2.02 ..... 145.

Paul Mace ... NCP
2762 ☐Mace Utilities 5.0 *(DOS utilities)* .. 55.
4688 ☐Mace Gold 1.0..... 79.

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3209 ☐Lucid 3-D 2.0..... 59.

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4384 ☐Ultravision 1.1 ..... 79.
3124 ☐ATBASE 1.22 ..... 119.

Peter Norton ... NCP
3152 ▣Norton Commander 2.0..... 52.
3146 ▣Advanced Utilities 4.5 ..... 89.
4150 ▣Dan Bricklin's Demo Prog. 2 1.0 109.

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3221 ☐Expanded Memory Mgr. 386 4.2 . 39.
3220 ☐DESQView 2.24..... 79.
4586 ☐DESQView 386 1.0..... 115.

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4396 ☐Grammatik III 1.1 ..... 52.

Relay Communications ... NCP
4651 ☐Relay Gold 3.0..... 149.

Revolution Software ... NCP
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3254 ▣Cruise Control 3.02 ..... 39.

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4155 ▣Rightwriter 3.1 ..... 54.

Samna ... NCP
5148 ☐Ami 1.0A ..... 129.

Simon & Schuster ... NCP
3314 ☐Typing Tutor IV 1.0 ..... 33.

Softlogic Solutions ... NCP
3546 ☐Disk Optimizer 4.01 ..... 45.
3542 ☐Software Carousel 3.0 ..... 49.
4855 ▣FATCAT 1.0 ..... 69.

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3495 ▣Professional Plan 1.02 ..... 59.
3499 ☐PFS:First Publisher 2.1 ..... 79.
4342 ▣PFS:First Graphics 1.0..... 89.
3478 ▣PFS:First Choice 3.01 ..... 99.
3496 ▣Professional Write 2.1..... 139.

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4669 ▣Harvard Graphics Access. Pk 1.0 299.
4284 ▣Harvard Project Manager 3.0... 409.

Spinnaker ... NCP
4441 ☐Resume Kit 1.29 ..... 25.
4444 ▣Splash 1.0 ..... 59.

Springboard ... NCP
3534 ☐Newsroom Pro 1.0..... 45.

Symantec ... NCP
4732 ▣SQZ!Plus 1.11 ..... 65.
3427 ▣Q & A Write 1.01..... 129.
3412 ▣Grandview 1.0 ..... 189.
3425 ☐Q & A 3.0 ..... 219.
3431 ☐*Breakthrough* Timeline 3.0..... 369.

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3729 ▣LapLink Mac 2.0 *(Mac-PC transfer)* 79.
5179 ▣LapLink III ..... 85.
4891 ▣ViewLink 1.0 ..... 95.
3727 ▣DeskLink 2.21 ..... 99.

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3561 ▣True BASIC 2.1 ..... 52.

Vericomp ... NCP
3765 ▣SoftBytes 2.0 ..... 35.

WordPerfect Corp. ... NCP
3799 ▣WordPerfect Library 2.0..... 69.
3798 ▣WordPerfect Executive 1.0..... 129.
3804 ☐WordPerfect 5.0..... 239.
3805 ▣WordPerfect Network 5.0..... 349.
3806 ▣Additonal Network Stations 5.0 .. 84.

WordStar USA ... NCP
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5000 ☐*Upgrade to Release 5.5*..... 89.

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XTREE Co. ... NCP
4512 ◉XTREE Pro 1.1 ..... 69.
XYQUEST ... NCP
4393 ☐XyWrite III Plus 3.55 ..... 229.

RECREATIONAL/EDUCATIONAL

Broderbund ... CP
1413 ☐Where in the World is Carmen Sandiego? ..... 25.
1414 ☐Where in the USA is Carmen Sandiego? ..... 25.
1417 ☐Where in Europe is Carmen Sandiego? ..... 29.
4948 ⊡JetFighter *(by Velocity)* ..... 35.
Electronic Arts ... CP
5180 ◉Dinosaur Discovery Kit *(First Byte)* 29.
5345 ⊡Might & Magic II *(New World)* .... 32.
1858 ◉Earl Weaver Baseball 1.5 ..... 32.
5181 ◉Hillsfar *(from SSI)* ..... 32.
5124 ◉688 Attack Sub ..... 35.
Microprose ... CP
4454 ☐F-19 Stealth Fighter ..... 39.
2725 ☐F-15 Strike Eagle ..... 22.
Microsoft ... NCP
2858 ☐Flight Simulator 3.0 ..... 35.
Mindscape ... CP
4897 ☐Gauntlet ..... 29.
4625 Colony *(3½" not available)* ..... 33.
2752 ⊡Balance of Power 1990 ..... 33.
Parlor Software ... CP
3159 ☐Bridge Parlor 2.3 ..... 49.
Sierra On-Line ... CP
4752 ◉Gold Rush ..... 25.
4455 ◉Leisure Suit Larry II ..... 33.
4345 ◉King's Quest IV *(512k version)* ... 33.
4399 ◉Manhunter ..... 33.
4456 ◉Police Quest II ..... 33.
3404 ◉Space Quest II ..... 33.
Spectrum Holobyte ... NCP
3467 ◉Tetris *(addicting mind teaser)* ... $24.
4283 ◉Falcon/AT *(F-16 simulation)* ..... 32.
5187 ◉VETTE! ..... 32.
Stone & Assoc. ... NCP
3436 ⊡Memory Master *(ages 2-6)* ..... 22.
3435 ◉My Letters,Numbers,Words *(2-6)* 22.
5231 ◉Phonics Plus ..... 22.
3439 ☐2nd Math *(ages 7-16)* ..... 27.
Sublogic ... NCP
4653 ☐Up Periscope ..... 25.
3335 ☐Jet *(requires CGA or EGA)* ..... 33.
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1302 SixPakPlus 64k C/S/P ..... 129.
4107 RAMpage Plus 286 512k ..... 419.
4105 RAMpage Plus MicroChannel 512k 469.
Compucable ... 2 years
1604 2-Position switch box ..... 29.
1605 3-Position switch box ..... 39.
Cuesta ... 1 year
1608 Datasaver 400 Watt *(standby power backup)* ..... 429.
Curtis ... lifetime
1681 Curtis Clip CC-1 ..... 6.
1686 Disk Holder DB-1 ..... 8.
1718 3½" Disk Holder DB-2 ..... 8.
1704 Printer Stand PS-1 ..... 18.
1713 Filtered SafeStrip SPF-3 ..... 24.
1678 Universal System Stand SS-3 ..... 25.
1694 Emerald SP-2 ..... 36.
1707 Ruby SPF-2 *(6 outlets; EMI/RFI filtered; 6 ft cord)* ..... $55.
1708 Ruby-Plus SPF-2 Plus *(w/FAX & modem protection)* ..... 69.
DCA ... 1 year
1761 Irma 2 *(3270 emulation board)* ... 729.
1764 Irma 2 Micro Channel ..... 729.
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1906 FX-850 *(80 col., 264 cps, 9 pin)* ... call
1904 FX-1050 *(136 col., 264 cps, 9 pin)* .. call
5183 LQ-510 *(80 col., 180 cps, 24 pin)* .. 349.
1930 LQ-850 *(80 col., 264 cps, 24 pin)* .. call
4117 LQ-950 *(110 col., 220 cps, 24 pin)* .. call
1917 LQ-1050 *(136 col., 264 cps, 24 pin)* call
4116 LQ-2550 *(136 col., 333 cps, 24 pin)* call
5184 LX-810 *(80 col., 180 cps, 9 pin)* ... 199.
1052 Printer-to-IBM cable *(6 feet)* ..... 15.
Everex ... 1 year
2029 1200 Baud Internal Modem ..... 79.
2030 2400 Baud Internal Modem ..... 149.
5th Generation ... 1 year
3952 Logical Connection 512k ..... 529.
4921 Logical Connection 1 Meg ..... 749.
Hayes ... 2 years
4763 Personal Modem 1200 *(with Smartcom EZ, 1 year warranty)* .... 145.
2304 Smartmodem 1200 ..... 289.
2305 Smartmodem 1200B *(w/Smartcom II)* 289.
2306 Smartmodem 1200B *(hardware only)* 259.
2307 Smartmodem 2400 ..... 429.
2308 Smartmodem 2400B *(w/Smartcom II)* 429.
2309 Smartmodem 2400B *(hardware only)* 399.
Hercules ... 2 years
2318 Graphics Card Plus ..... 189.
5120 VGA Card ..... 189.
Intel ... 5 years
4696 2400B Internal Modem ..... 159.
2352 2400B Internal Modem 2 *(for PS/2)* 249.
5119 2400 Baud External Modem ..... 179.
2346 Inboard 386/PC w/1 Meg ..... 599.
4646 Inboard 386/PC Piggyback 4 Meg 1249.
2339 Inboard 386/AT *(req. inst. kit)* .... 859.

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4272	Above Board 2 Plus 512k	469.
4339	Above Board Plus Piggyback w/2 Meg *(upgrades to 6 Meg)*	call
4275	Connection Coprocessor	769.
4857	Visual Edge *(improve the output of your HP Laserjet II)*	449.
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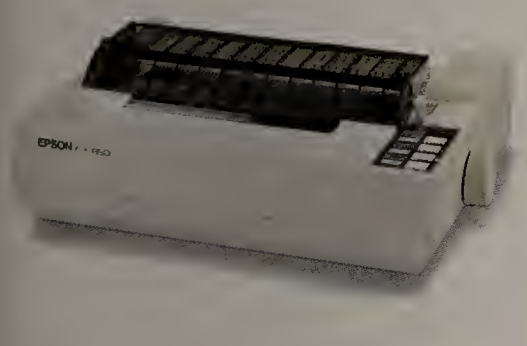
2375	8087 *(for IBM-PC & XT)*	95.
2374	8087-2 *(for 8 MHz 8088 CPU's)*	139.
2368	80287 *(for 6 MHz 80286 CPU's)*	149.
2370	80287-8 *(for 8 MHz 80286 CPU's)*	219.
2369	80287-10 *(for PS/2 Models 50 & 60)*	259.
4750	80387SX *(for 80386SX CPU's)*	359.
2371	80387 *(for 16 MHz 80386 CPU's)*	399.
2372	80387-20 *(for 20 MHz 80386 CPU's)*	459.
	Kensington Microware ... 1 year	
2581	Masterpiece	94.
2582	Masterpiece Plus	109.
4972	PowerTree 10	19.
4973	PowerTree 20	29.
4974	PowerTree 50	59.



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2603	Three-button Joystick	33.
2597	High Speed Joystick Adapter Card	25.
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4127	Dyna Mouse GM6+ *(w/Dr. Halo III)*	49.
4675	GM6000 Mouse *(350-1050 dpi)*	59.
	Logitech ... lifetime	
4145	Series 2 Mouse *(for PS/2's)*	75.
4388	ClearCase Mouse *(serial only)*	69.
5151	New HiREZ Mouse *(C9)*	89.
5152	Mouse w/Paint Show *(C9)*	99.
4297	ScanMan *(hand held scanner)*	219.
	Magnavox ... 2 years	
5051	VGA Adapter *(9AV610)*	259.
4758	13" CGA Monitor *(8CM515)*	269.
4760	13" Hi-Res Monitor *(9CMO53)*	369.
4761	13" VGA Monitor *(9CMO62)*	389.
4762	13" VGA Monitor *(9CMO82)*	449.

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2400EX (external)	$179.
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	Microsoft ... lifetime	
2870	Mach 20 *(1 yr. wrty., includes free PCTV installation video)*	349.
2886	Mach 20 Disk Plus Option *(floppy controller)*	69.
2887	Mach 20 Memory Plus Option *(512k upgradeable to 3.5 Meg)*	339.
2897	Mouse with Paintbrush	109.
2896	Mouse with Easy CAD	125.
2898	Mouse with Windows 286 2.1	139.
	Mouse Systems ... lifetime	
2812	OmniMouse *(serial only; 1 year wrty)*	39.
4306	PC Mouse II w/PC Paint+	89.
4350	PC Mouse II w/Autosketch	105.
	NEC ... 2 years	
4799	Multisync 2A *(VGA Monitor)*	499.
5085	Multisync 3-D Monitor	699.
	Orchid Technologies ... 4 years	
3069	Tiny Turbo 286 *(accelerator board)*	219.
4765	Designer 800 VGA *(360 x 480)*	249.
4690	ProDesigner VGA *(800 x 600)*	319.
	Pacific Rim ... 1 year	
5010	1.2 Meg External *(for PS/2's)*	215.
5011	360k External 5¼" Drive	179.
	PC Power & Cooling Sys. ... 1 yr	
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3202	Turbo Cool 150 *(25° - 40° cooler)*	129.
3205	Turbo Cool 250 *(25° - 30° cooler)*	169.
3200	Silencer 150 *(84% noise reduction)*	115.
3201	Silencer 200 *(69% noise reduction)*	149.
4514	Turbo Cool 375	299.
	PC Support Group ... 1 year	
3211	Breakthrough 286-8 *(8 MHz accelerator)*	299.
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3097	Microbuffer Inline *(par. print buffer/32k)*	135.
3103	2400 Baud Internal Modem *(with PROCOMM)*	139.
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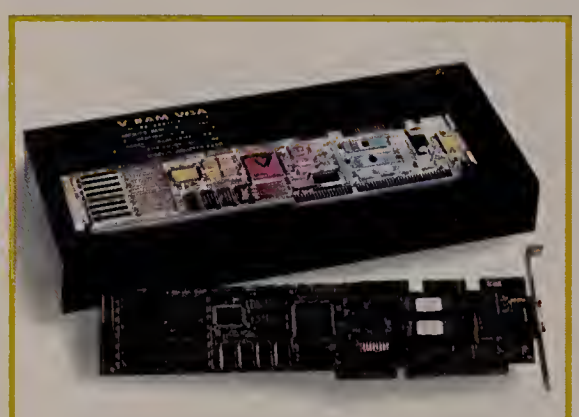

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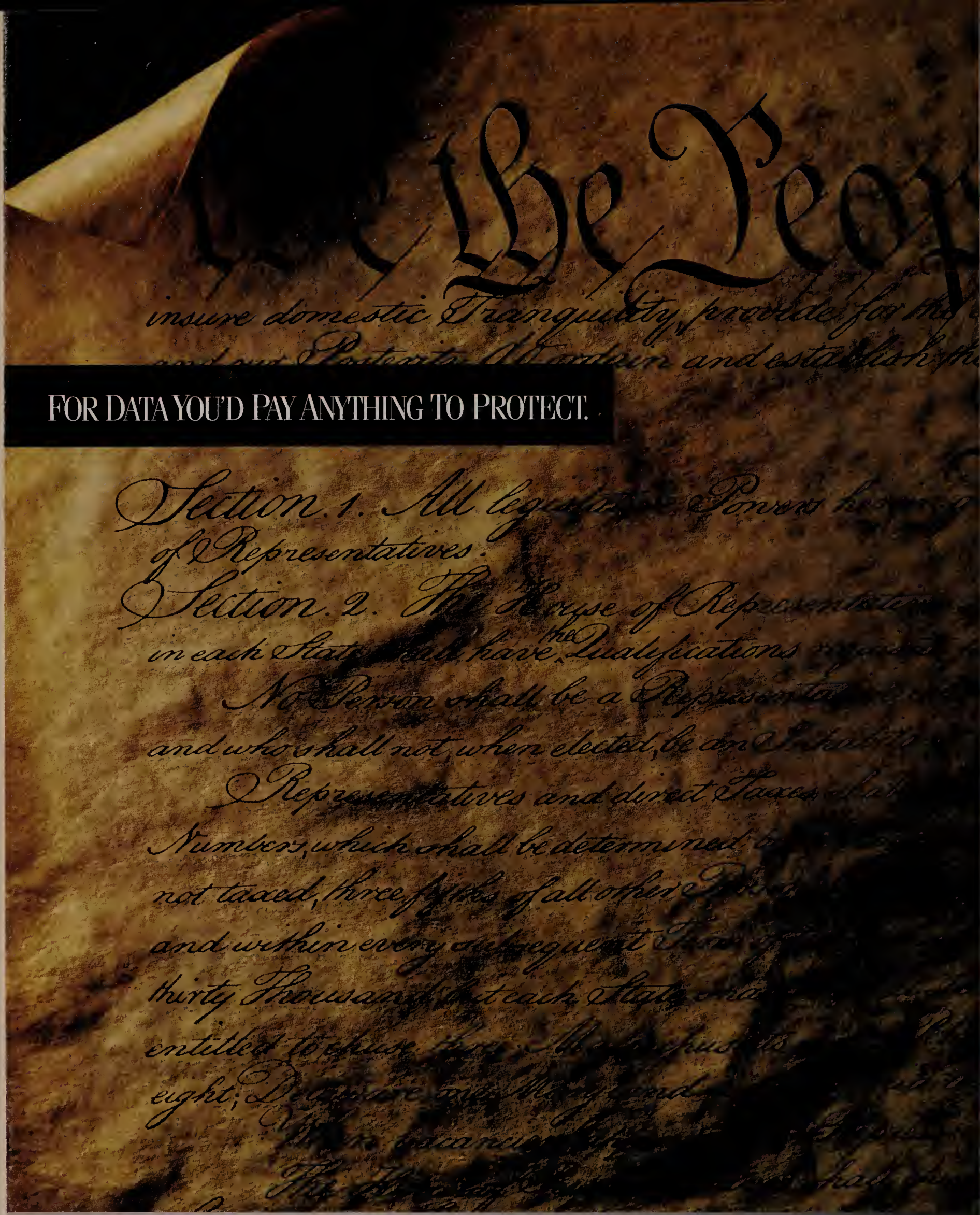

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SPECIAL REPORT

WINDOWS

A PC World Supplement on Windowing Environments and Applications

Edited by Robert Luhn

RON CHAN

WINDOWS EDGES INTO THE WORKPLACE

Windows isn't just for desktop publishers anymore. Thanks to Windows/386 and a handful of bread-and-butter applications, business users of all stripes are taking the first steps toward full-time graphical computing.

Daniel Brogan

For years, Microsoft's Bill Gates has been telling us there would be guys like Rick Bertuzzi. Now, finally, there are.

Bertuzzi is an office manager for Stockton, California–based Shawver Trucking. Every morning his PS/2 Model 60 boots up *Microsoft Windows*, which stays there until the end of the day. He manages the company's books with Microsoft's *Excel*, retouches scanned route maps with Z-Soft's *Paintbrush Plus*, and puts out correspondence with Samna's *Ami*. Bertuzzi is even creating an on-line hypertext rate guide with Owl International's *Guide*. And after struggling with *Windows*' MS-DOS Executive, he finally masked the environment's uglier side with Publishing Technologies' *PubTech File Organizer* (see the *PubTech File Organizer* review in the *Windows* Special Report in this issue). "I haven't seen a DOS prompt in so long, I've forgotten what it looks like," says Bertuzzi.

So committed is Bertuzzi to *Windows*' graphical approach to computing that he recently retired his copy of *WordPerfect 5.0* in favor of *Ami*. "*WordPerfect* is a fantastic program," he says, "and I'm sure it has a lot of great features that I'm giving up. But moving charts and text between *Excel* and *Ami* and quickly switching between applications is just too good to resist."

JOSEPH LITTLE
State Department of Education; Trenton, New Jersey

LARRY TRUE
Toyota; Georgetown, Kentucky

A Kinder, More Reliable Environment

Bertuzzi and his co-workers represent a new breed of PC users: people who do the bulk of their computing in *Windows*. For much of its four-year history, users widely dismissed *Windows* as slow and fat. If you had to use applications like *PageMaker* or *Designer*, you grudgingly endured Microsoft's answer to the user-friendly Macintosh—but only until the task was completed. Then you hied yourself back to the familiar DOS prompt.

But today, *Windows* has matured to the point that it's catching on as a full-time operating environment for everyday users. "Early versions of *Windows* were pretty awful," says Alan Lambert, material control manager for Tiburon Systems, which provides technical support to the U.S. Navy. "But *Windows/386* handles DOS applications far better." So much so that the Navy now insists that its PCs run the environment whenever possible to promote a standard user interface.

And standardization is finally putting *Windows* over the top. "Give *Windows* users a new *Windows* application, and they already know how to get a lot done with it," says Bill Bailey, a senior member of Du Pont's consulting team that specializes in energy management. The group uses Micrografx's *Designer* to illustrate the advantages of the company's energy management systems to clients. "We're not power users, and we don't want to be," Bailey says. "We need to be able to use a program right away, even if we haven't used it in several weeks. *Windows* lets us do that."

Power Windows

This new breed of *Windows* devotees may not be power users, but they do have one thing in common with them: serious hardware. 80386 PCs are the norm, as is 2MB to

4MB of add-on memory. Users also tend to favor *Windows/386* over the standard issue *Windows/286*.

George Roukas, manager of business systems analysis for a Fortune 50 financial services company, notes that while a 386 system requires a bigger investment up front, the possible payoffs can be far bigger. "The benefits *Windows/386* brings in ease of use and superior applications more than offset the cost," he says.

As evidence, Roukas points to a key monthly operating report that traditionally took a director and two business analysts three weeks to churn out. Now, thanks to a custom *Excel* template and lightning-fast PCs, "the job is done in a couple of days. That's definitely worth the cost of some 386s."

DOS Rules—For Now

Of course, the adoption of *Windows* isn't universal. Joseph Little, a special assistant at the New Jersey Department of Education, loves *Excel* but limits his use of *Windows* to the runtime module bundled with the spreadsheet.

"As far as graphic interfaces are concerned, we're committed to the Presentation Manager," he says. "I know a lot of people advocate *Windows* as a steppingstone to OS/2, but our experience has been that every step you take brings along its own complications. We'd rather jump directly to OS/2."

Even Eikon Systems, which developed the *Windows*-based *ClickArt Scrapbook+*, confesses that *Windows* isn't the company's default interface. "It's not a completely supported environment yet," admits Eikon vice president David West, whose company has a vested interest in the success of Microsoft's brainchild. "There's still no good, fast programming editor for developers. And end users still need first-class data base and accounting packages."

Similarly, while you'll find *Windows* applications on 75 percent of the 120 PCs at Toyota's Georgetown, Kentucky, facility, office automation specialist Larry True says there's little interest in making *Windows* the company's standard environment. "It's a lot faster and easier to type DOS commands than to click around with the mouse," True says. "Our users want the freedom to use whatever works best at the moment."

Many of the users polled by *PC World* are finding that *Windows*—especially *Windows/386* powered by a 386 and with plenty of RAM—works best for them. But the environment still has a long way to go before it wins over a computing generation brought up on the A> prompt. For every Rick Bertuzzi in this world, there are still plenty of people like Bill Reader.

GEORGE ROUKAS
Financial services company; New York, New York

RICK BERTUZZI
Shawver Trucking; Stockton, California

PHOTOS BY ANDY FREEBERG, ANDY SNOW, ANDY FREEBERG, JOHN HARDING (left to right)

"I use *Windows* quite often, and I've experimented with it as my standard environment," says Reader, manager of the information center at Northern Telecom in Richardson, Texas. "But I still feel most comfortable with plain old DOS. When my boss says he wants something *now*, I panic and get out of *Windows* pronto—and jump back to the command line as fast as I can." ●

Daniel Brogan is the editor of Personal Publishing.

GRAPHS FOR NUMBER CRUNCHERS

Xerox Graph targets the analytical side of business graphics.

Dennis Dykstra

Charting packages are like restaurants: They may shine in preparation or in presentation, but seldom both. *Xerox Graph* focuses on preparing data, leaving drawing and other fancy presentation features to its sibling, *Xerox Presents* (see the review in "Special Report: Windows," *PCW*, May 1989). *Xerox Graph* is for fast, professional-level on-screen analysis and quick printouts, not for elegant slides.

Scheduled to ship by the time you read this, *Xerox Graph* is the $295 *Windows* version of Cricket Software's Macintosh-based *Cricket Graph*. This intuitive program couples a solid set of charts with plenty of numeric functions—enough to do some serious number crunching without cranking up your spreadsheet.

Although aimed at data analysts, scientists, and engineers, *Xerox Graph* makes it easy for anyone to create a chart. You simply enter data in a built-in 40-column worksheet or import it from, say, *1-2-3*, click on the desired data sets, and select one of 12 chart types displayed in an on-screen toolbox. Along with the usual bar, stacked bar, line, pie, and word charts, you get scatterplots, and even polar plots (scatter graphs that plot points from the center of a circle)—perfect for engineers calculating load distribution. Serious data analysts can plot a humongous 2700 data points per chart, compared with *Xerox Presents*' mere 20.

Xerox Graph's chart-editing functions fall short of those offered by *Freelance Plus*, but you can tap 3-D effects, 256 colors (with EGA or VGA setups), and four scalable Bitstream fonts (*Fontware* is part of the deal) as well as fit several graphs on a page. You can change fonts and move almost any on-screen object with click-and-drag, Mac-like ease.

But data analysis is where *Xerox Graph* struts its stuff. You can transform data with logarithmic, exponential, and trigonometric functions, among others. If you're a finance maven, you'll love the ability to "fit" data using linear, polynomial, logarithmic, or exponential regression forms. Both linear and logarithmic axes are supported.

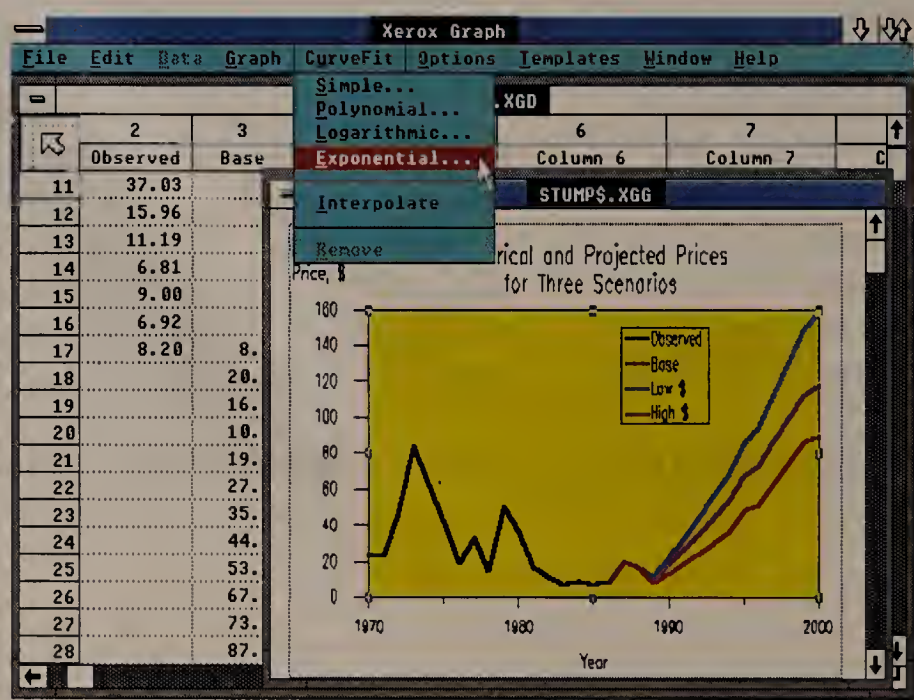
Xerox Graph gets a gold star for importing .WKS, .WK1, SYLK, DIF, ASCII, and *Cricket Graph 1.2* files, and data via *Windows*' Clipboard. File export, however, is limited to the Clipboard and *Windows* metafiles, which leaves most desktop publishers out in the cold.

Printer, plotter, and slide output support is extensive, thanks to *Windows*. You can even send image files to Autographix slide centers using a built-in telecommunications utility. Unlike with *Xerox Presents*, however, you can't create "slide shows" on your monitor.

Like most *Windows* products, *Xerox Graph* demands an 80386 or fast 80286 system and a minimum of 1MB of RAM. Does it merit your consideration? It can't match the presentation power of a *Harvard Graphics* or the analytical prowess of a *StatPac Gold*. But it's cheaper than either of those, offers enough muscle for many number crunchers, and is *very* easy to use. And that may be worth the price of admission. ●

Dennis Dykstra is a contributing editor for PC World.

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.



Besides offering 12 chart types, such as the line graph shown, Xerox Graph can fit several types of smoothed curves to your data.

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A MACRO PROCESSOR FOR WINDOWS

Automate almost anything under the Windows sun with Tempo.

John Walkenbach

PC users long ago discovered the advantages of *Keyworks*, *SmartKey*, and other macro processors. Instead of repeating some mind-numbing task over and over, you could automate it by recording your keystrokes as a macro and playing them back at the touch of a key.

Windows users, unfortunately, have been without such handy aids. But with the arrival of *Tempo for Windows* from Affinity Microsystems, you can at last automate tasks in the *Windows* environment and within any *Windows* application. You could easily create a macro, for example, that opens several applications and automatically positions and resizes the windows to your liking.

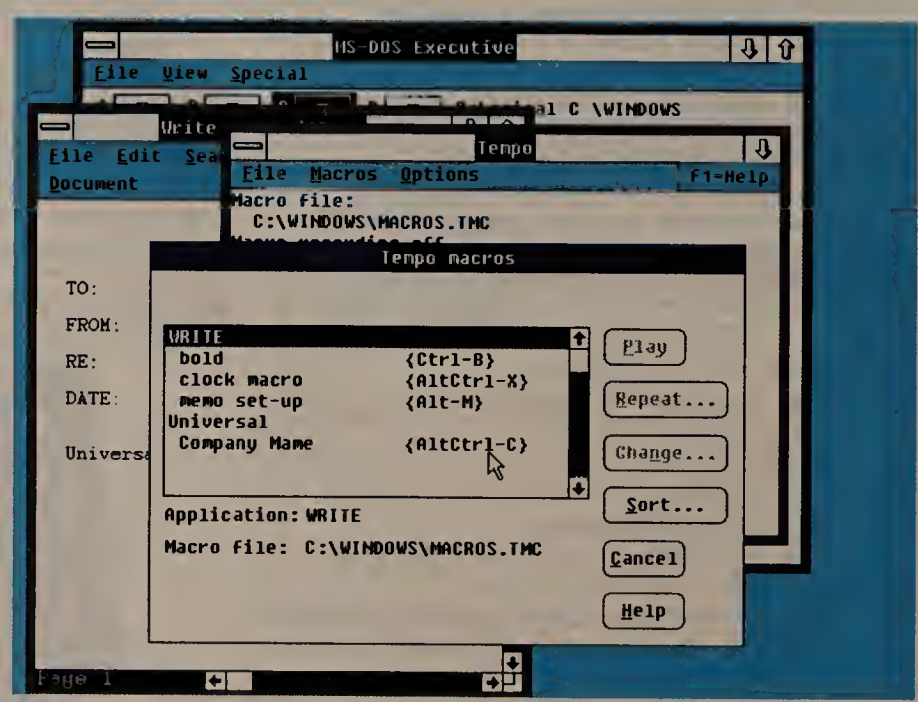
Tempo is easy to learn and use, but the $99.95 premier release will be strictly bare bones, lacking even a macro editor. In addition, macros in the prerelease version examined here couldn't pause to accept user input—a failing the vendor may fix when the product ships in July.

If you've used a DOS macro processor, you'll find *Tempo* quite familiar. To record a macro, press *Tempo*'s changeable hotkey combination and start typing. When you're done, a dialog box asks you to supply a name and a key assignment. You run the macro by typing its hot key or double-clicking its name from a pulldown menu. A savvy user will be spinning macros in about 10 minutes. If you get stuck, context-sensitive help is available.

Tempo does offer some clever extras. Unlike its more powerful DOS cousins, *Tempo* records both keystrokes *and* mouse movements—a boon for desktop publishers and anyone else who manipulates graphics. You can also control playback speed, make a macro repeat, direct macros to call other macros, and so on. To insert such control statements, you merely pause during macro recording and select the function from an on-screen list.

Better still, you can restrict a *Tempo* macro to a specific application. For example, you could define two <Alt>-U macros—one to underline a range in *Excel* and the other to underline text in *Ami*. *Tempo* will sense the context and play back the proper macro. You can also designate "universal" macros that play back in any *Windows* application. Since macros are stored on disk, there is practically no limit to the number or size of macros you record.

Before you plunk down your money, just remember that you can't edit *Tempo* macros. And though it works with *Windows 2.0* and *Windows/386*, *Tempo* won't work with run-time versions of *Windows* or control DOS programs running under *Windows*' aegis. But if you need macro support in *Windows*, *Tempo* is a serviceable product—and for now, it's the only game in town. ●



Tempo sorts macros by the application in which they were recorded. You can display all macros by name or hot key, and invoke universal macros in any Windows application.

John Walkenbach is vice president and manager of market research at a major savings and loan association based in Southern California.

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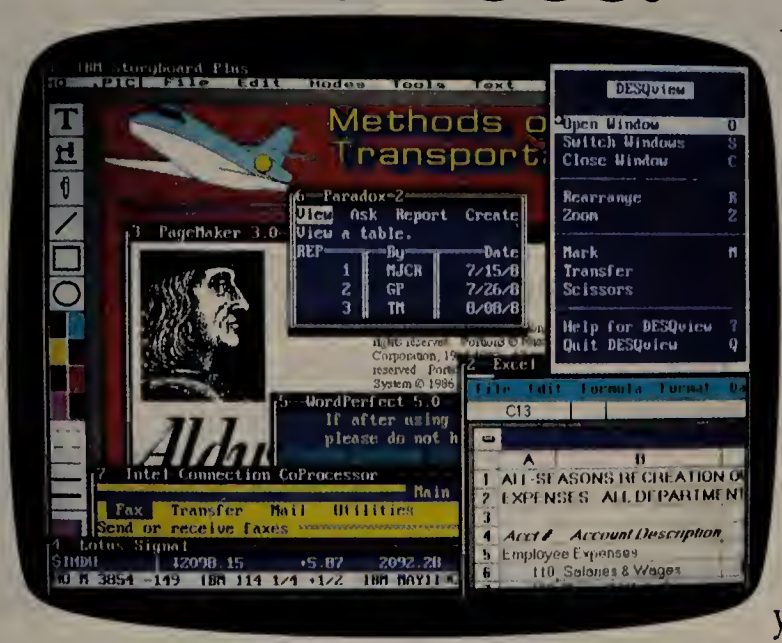
> For programmers, DESQview's API, with its strengths in inter-task communications and multitasking, brings a quick and easy way to adapt to the future. With the API's mailboxes and shared programs, programmers are able to design programs running on DOS with capabilities like those of OS/2.



DESQview actually *increases* memory 30K on CGA PCs; 20K on monochrome and Hercules PCs. That's good news for users of big desktop publishing, CAD and database programs.

Introducing DESQview 386

For users of 80386 PCs and PS/2s (or PCs with 80386 add-in boards, such as the Intel Inboard 386), there's DESQview 386 (a combination of DESQview 2.2 and the new QEMM-386 Quarterdeck Expanded Memory Manager, version 4.2).

DESQview 386 gives you extraordinary power. Run text, CGA, EGA, VGA, and Hercules programs in windows and in the background. Run 32-bit 386 programs, like Paradox 386, and IBM Interleaf simultaneously with your favorite DOS programs.

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If there's any doubt about our commitment to your PC and PS/2 productivity, just look at our accomplishments over the years. We think you will understand why PC Magazine gave DESQview its Editor's Choice Award for "The Best Alternative to OS/2," why readers of InfoWorld twice voted DESQview "Product of the Year," why, by popular vote at Comdex Fall for two years in a row, DESQview was chosen "Best PC Environment" in PC Tech Journal's Systems Builder Contest.

INFO WORLD 1986 AND 1987 PRODUCT OF THE YEAR

DESQview lets you have it all now.

DESQview System Requirements: IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286, or 80386 processors) with monochrome or color display; IBM Personal System/2• Memory: 640K recommended; for DESQview itself 0-145K• Expanded Memory (Optional): expanded memory boards compatible with the Intel AboveBoard; enhanced expanded memory boards compatible with the AST RAMpage; EMS 4.0 expanded memory boards•Disk: two diskette drives or one diskette drive and a hard disk•Graphics Card (Optional): Hercules, IBM Color/Graphics (CGA). IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA)• Mouse (Optional): Mouse Systems, Microsoft and compatibles• Modem for Auto-Dialer (Optional): Hayes or compatible• Operating System: PC-DOS 2.0-4.0; MS-DOS 2.0-3.3• Software: Most PC-DOS and MS-DOS application programs; programs specific to Microsoft Windows 1.03-2.1, GEM 1.1-3.0, IBM TopView 1.1• Media: DESQview 2.0 is available on either 5-1/4" or 3-1/2" floppy diskette.

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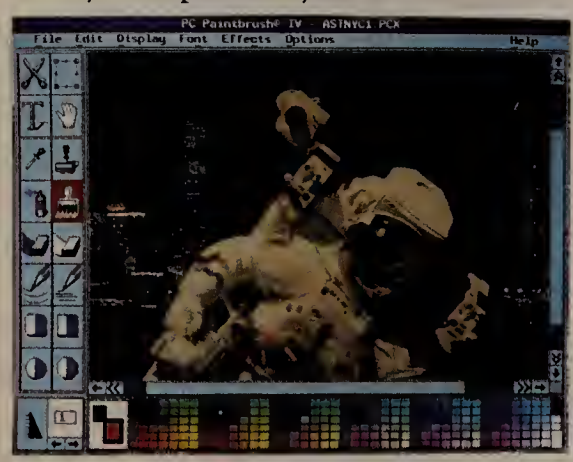

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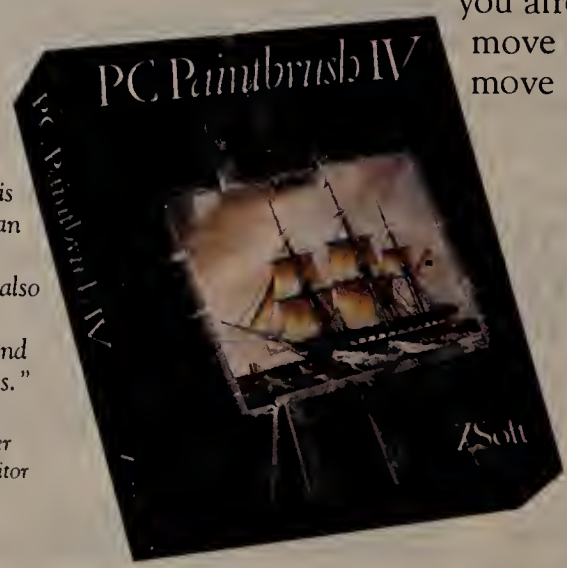

"PC Paintbrush IV is destined to become an important tool, not only for artists, but also for people who use desktop publishing and presentation graphics."

Michael Miller
Executive Editor
InfoWorld
5/1/89

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PubTech File Organizer 2.1

Windows front end

PROS: Mocintosh-like desktop, icons and folders, easy to set up, RAM efficient, ample utilities

CONS: Con't create custom icons, manual missing some steps

Microsoft Windows has always been a weak sibling compared with the resource-rich Macintosh. *PubTech File Organizer 2.1* from Publishing Technologies aims to change that. This program fixes *Windows*' most obvious flaw with an icon-driven front end that mimics the Mac, but in a distinctly different way. And unlike some *Windows* utilities, *PubTech* lets novices set up custom desktops in no time flat.

As on the Mac, you manipulate predefined icons that represent disk drives, subdirectories, program and data files, printers, and so on. For example, to print an ASCII file, you drag its icon to the printer icon. Double-click a data file created with a *Windows* application, and *PubTech* loads the two together. Exit *PubTech*, and the entire desktop—icons, window size and placement, and so on—is saved and will be reloaded for the next *Windows* session.

When you first load *PubTech*, you get a pulldown menu packed with utilities, and a group of icons for installed printers, disk drives, and other hardware. Click a drive icon, and a window fills with miniature folders representing subdirectories; click a folder, and all the various files and folders it contains are laid out in apple-pie order. To copy or move an entire folder of files, just drag its icon to the desired destination with the mouse.

Much of this is standard Mac fare, but *PubTech* offers far more control over the desktop environment. With a menu command, you can automatically tile, overlap, and cascade windows; shrink icons to fit more of them on screen; change screen fonts; straighten up a messy desktop; view directories in a hierarchical tree format; or assign a hot key to run any application or .PIF file. *PubTech* also tosses in an integrated text editor and move, disk copy, and backup and restore utilities, along with *Norton*-like unerase, file find, and text search utilities.

This newest *PubTech* is also a RAM miser. It normally needs 49K, but if expanded memory is available, it shrinks to 18K. Better still, if you minimize a program to an icon on the desktop, you liberate most of its RAM—something *Windows* can't do. Need still more memory? A few quick commands consolidate memory throughout the *Windows* environment.

PubTech sounds amazing, but it just does what *Windows* should have done in the first place. And for that alone, it's worth the money. —*William Urschel*

William Urschel is president of Arc Tangent, a software development company in Santa Barbara, California.

WHERE TO BUY

PubTech File Organizer 2.1
Publishing Technologies, Inc.
7719 Wood Hollow Dr. #260
Austin, TX 78731
800/PUBTECH, 512/346-2835
LIST PRICE: $199.95, site licensing ovailoble
REQUIREMENTS: DOS 3.0 or later version, Windows 2.03 or loter version; mouse recommended
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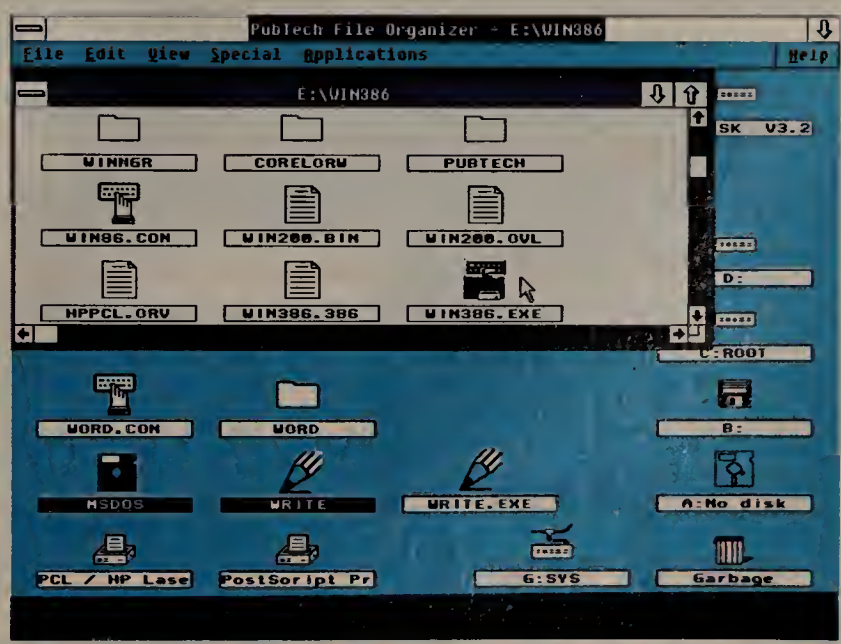
OTHER SUPPORT: on-site training available.
Reader service no. 853



PubTech File Organizer replaces the MS-DOS Executive with a spittin' image of the Mac, complete with icons, folders, and click-and-drag operations.

RON CHAN

Q+E 2.06

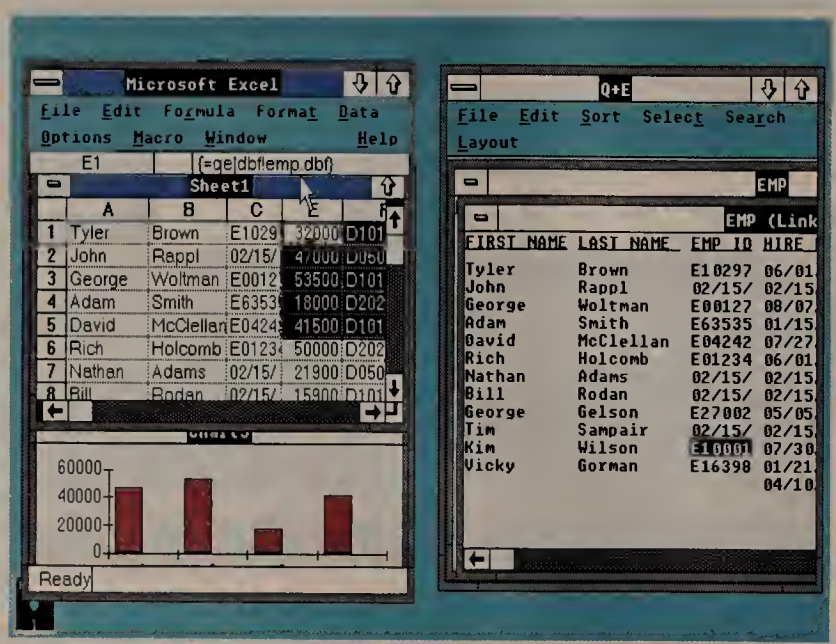
dBASE utility

PROS: Direct dBASE doto monipulotion from Windows, DDE support, performs joins on reloted doto files

CONS: Not compotible with dBASE IV; incomplete index file support; locks report formatting functions, single record view, and doto validation

When *PC World* reviewed Pioneer Software's *Q+E 1.2* in the January *Windows* Special Report, we felt the program might someday join the august ranks of *dSalvage*, *dQuery*, and other classic *dBASE* utilities. You simply clicked a listed .DBF file, and *Q+E* poured the data into a neat worksheet format. To view, edit, or build complex queries, you just highlighted the desired columns and selected commands from pulldown menus. You could even view two different parts of the same file and save queries for later use. Unfortunately, *Q+E* was fatally flawed—it couldn't update index (.NDX) files tied to .DBF files, display linked records from related files, or produce anything but rudimentary reports.

Q+E 2.06 addresses some of the original objections and adds Dynamic Data Exchange (DDE) support, which allows other *Windows* applications, most notably *Excel*, to access and directly query .DBF files. However, this upgrade still falls short, and the program isn't yet a serious tool for *dBASE* users.



With DDE, Excel can draw on dBASE data selected by Q+E. Edits done with Q+E immediately update Excel and anything else in the link—such as a bar chart.

For example, *Q+E* updates only a *single* index file at a time. Although this approach may minimize the need for sorting, most data base applications cross-reference data using multiple indexes. Changing the data in *Q+E* without updating every related index corrupts the entire application. *dBASE IV* support is also lacking, especially annoying in the case of the new .MDX format, which stores multiple indexes in one file. *Q+E* won't win awards for easy data entry, either. Finding fields that don't fit in a window means laborious scrolling. Worse, there's no data validation feature for controlling changes to a data base.

On the bright side, *Q+E*'s use of *Windows*' DDE suggests exciting possibilities, especially for *Excel* users. For example, you can enter an *Excel* cell formula that references *dBASE* data via *Q+E*. Change the .DBF data with *Q+E*, and it's immediately changed in the *Excel* worksheet (at present, this is a one-way facility). You can even link *Excel* to a *Q+E* query that selects certain fields and records. The downside: Because *Q+E* can't consolidate *dBASE* data (say, sales by region and product), you have to do this summarizing in *dBASE*.

A final disappointment is *Q+E*'s claim to SQL query capability. The program executes only four SQL commands—Select, From, Where, and Order. The ability to nest commands and the internal optimization that gives SQL its punch are nowhere to be found.

Pioneer Software promises to deliver the goods in the $149 *Q+E 2.1*. If Pioneer makes good, *Q+E* could be a winner. But before you lay down your money, check this space. —*Alan C. Schwartz*

Alan C. Schwartz is a data base application specialist living in San Francisco.

WHERE TO BUY

Q+E 2.06
Pioneer Softwore
5540 Centerview Dr. #324
Roleigh, NC 27606
919/859-2220
LIST PRICE: $119
REQUIREMENTS: Windows/386 2.03 or loter version, or Windows/286 2.03 or loter version; mouse recommended
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–5
OTHER SUPPORT: none
Reader service no. 854

DynaComm 2.0

Communications software

PROS: Ample modem controls, error-checking protocols, and bulletin boord protocols

CONS: Erratic file transfers, no dialing directory

With *DynaComm*, Future Soft Engineering brings windowing—and all its obvious benefits—to the tempestuous world of communications. For example, you can edit a file in one window while running a *DynaComm* session in another, stack eight windows (and files) on screen at once, and move data between applications with the *Windows* Clipboard.

Among *DynaComm*'s many features is an ample list of file transfer protocols—including XMODEM CRC, YMODEM, Kermit, YTERM, and Future Soft's own—and eight terminal emulations, ranging from IBM 3101 to VT 220. Modem controls are impressive: You can configure the modem using various command sets and specify the serial port's transmission rate, flow control, and more. Also available is a remote feature that enables you to use *DynaComm* as a bulletin board. True to its *Windows* heritage, *DynaComm* supports *Windows*' Dynamic Data Exchange (DDE) protocol, so you could write a script that downloaded stock quotes from Dow Jones and automatically updated an *Excel* worksheet.

At first glance, *DynaComm* looks confusing. Although its button-down interface is well organized and easily understood, with individualized pulldown menus for each communications function, navigating the course is an exercise in windows bureaucracy. Sending a file, for example, involves nearly a dozen steps.

Fortunately, *DynaComm* contains a very efficient script recorder that captures your keystrokes and mouse selections as you progress through this labyrinth of menus. Once the routine is saved to file, you can run it from a pulldown menu using a single mouse click.

The lack of a dialing directory is also a nettling problem because there's no way to view dialing entries alongside their phone numbers, script files, or parameters. *DynaComm* keeps phone numbers and parameters in separate files, which you must load before each transfer.

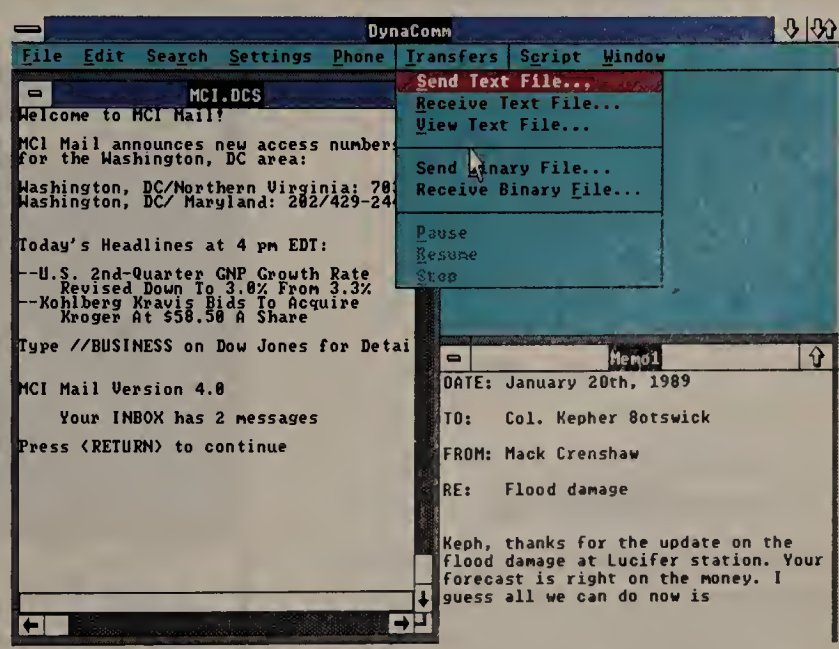
Other bugs and design quirks are more than just annoying. For example, *DynaComm* sometimes refuses to acknowledge the file you want to transfer, and it often freezes during ASCII and XMODEM transfers when used with *Windows 2.1* (that latter problem can be corrected with a software patch). Furthermore, unless you remember to click the Hang Up option when exiting a service, *DynaComm* assumes you're still connected. Unlike most communications packages, *DynaComm* doesn't inform you about a transfer's progress or its completion, leaving you to wonder whether the program has locked up or not.

These problems detract from *DynaComm*'s most significant features, such as total modem control and bulletin board capability, but they're not incapacitating. If you need *Windows*-based communications, this is one program you can't ignore. —*Judy Getts and TJ Byers*

Judy Getts and TJ Byers are contributing editors for PC World. ●

WHERE TO BUY

DynaComm 2.0
Future Soft Engineering, Inc.
1001 S. Dairy Ashford #203
Houston, TX 77077
713/496-9400
LIST PRICE: $295
REQUIREMENTS: 120K, hord disk, Windows 2.03 or later version
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 9–4:30
OTHER SUPPORT: CompuServe forum
Reader service no. 855



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RON CHAN

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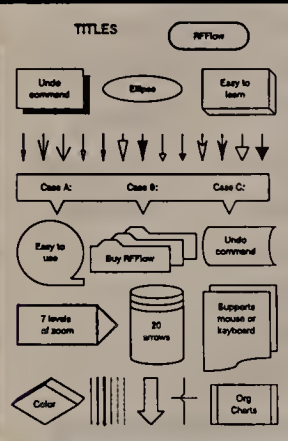

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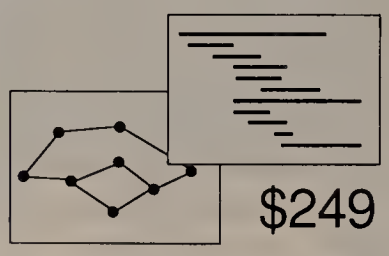

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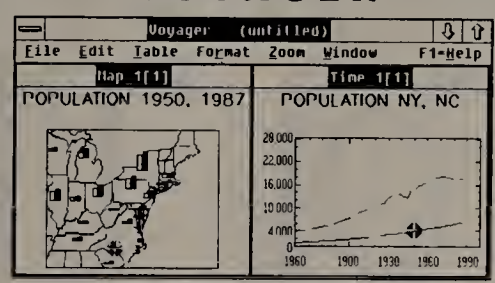

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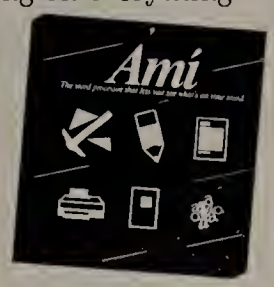

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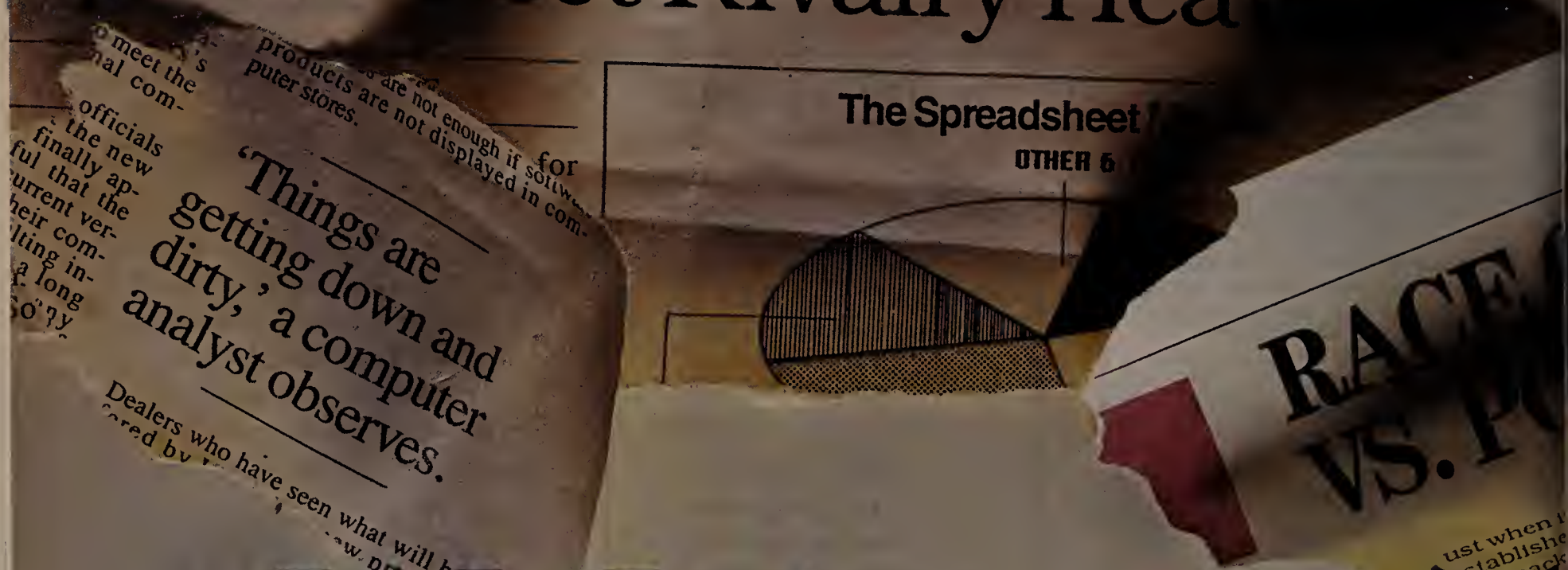
PC WORLD's 2.5 million readers anxiously await the November 1989 ***PC WORLD WINDOWS Special Report*** and ***PC WORLD WINDOWS Catalog***. So get ready for them by calling Sandra Wade or Greg Messina at **PC WORLD**. Don't delay, the **November** WINDOWS Catalog **closes August 24** and this is one "window of opportunity" you can't afford to miss.

PC WORLD

Spreadsheet Rivalry Hea



We Interrupt T War For This Im

To all those unlucky enough to be stuck smack in the middle of the current spreadsheet confusion, take heart.

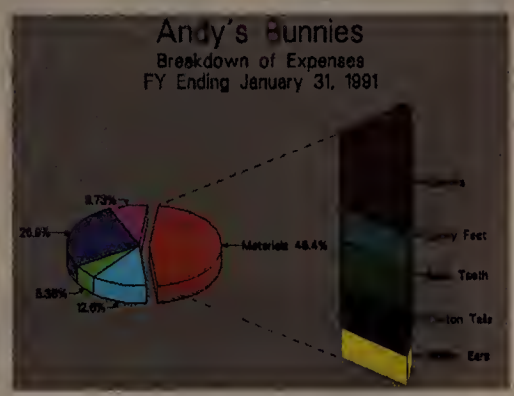
There is, at last, a viable alternative to war: revolution.

One that delivers even more performance than you have (ahem) been waiting for, but without demanding expensive new hardware or extensive retraining. And without abruptly cutting you off from any user in your company, even those on mainframes.

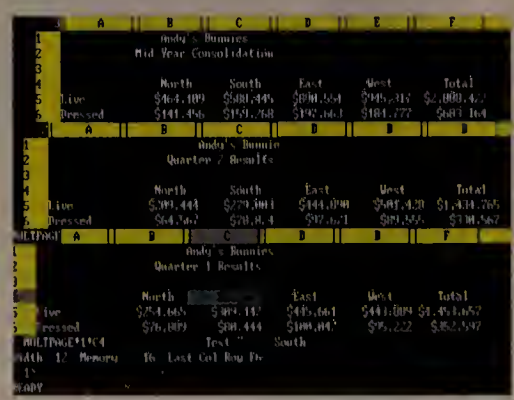
The name of the spreadsheet is SuperCalc® 5.

And what it can do for you is, frankly, quite revolutionary.

Let's begin at the end. Stand-alone quality graphic capabilities have been built in. Offering hundreds of presentation treatments from word charts to three-dimensional bar, pie, scatter, and polar graphs.



Present a state-of-the-art picture of your work.



Link just about everything in sight.

And with SuperCalc5, you select fonts, lines, boxes, grids and shading. All of which can be used to produce the highest quality customized reports.

Plus, SuperCalc5 actually makes productivity easier. An integrated Undo feature simply reverses unwanted commands. And a truly comprehensive system of debugging highlights costly errors and analyzes macro logic.

Perhaps even more impressive is the way SuperCalc5 can link spreadsheets. Up to 255

Catch bugs before they come back to bite you.

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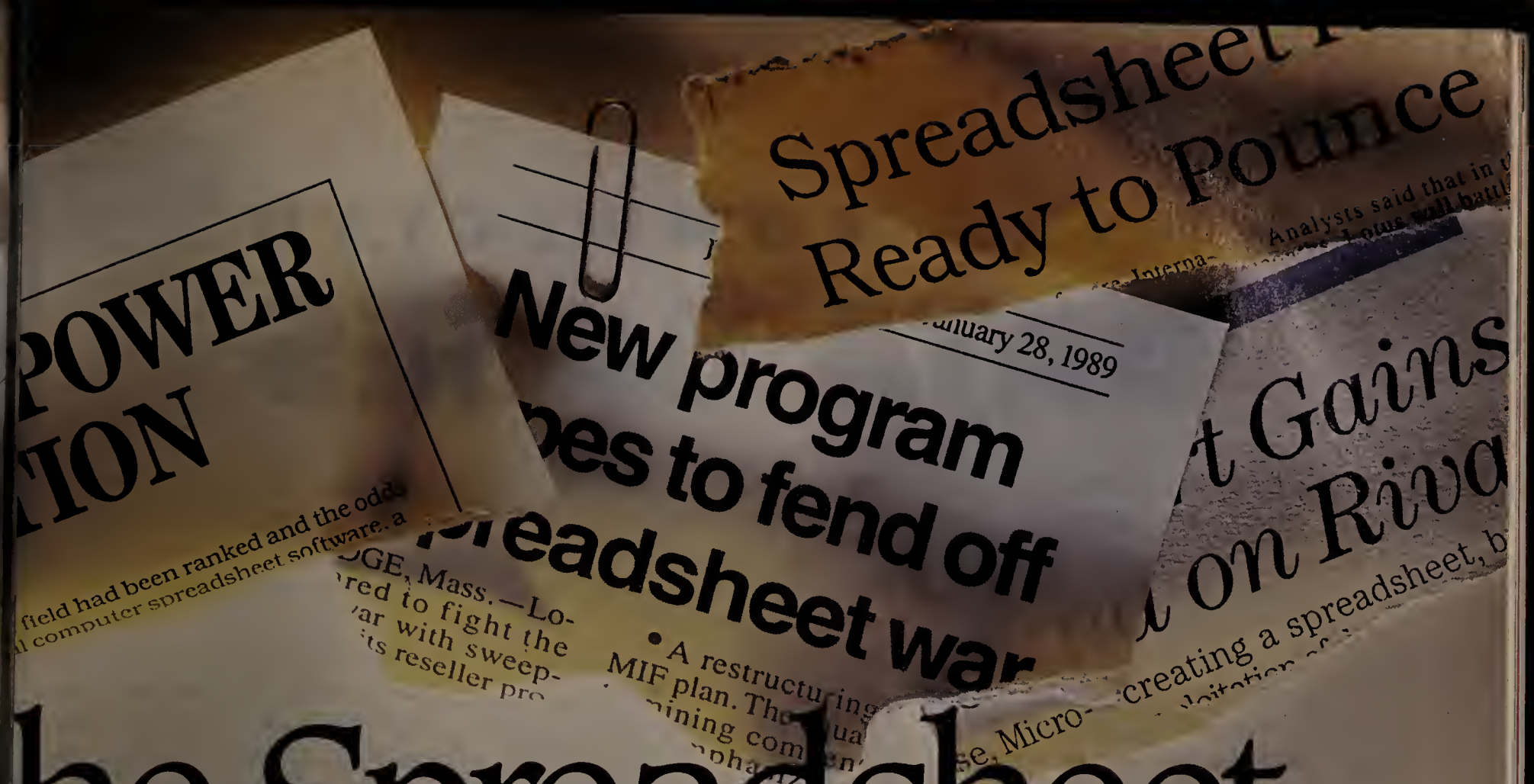

he Spreadsheet portant Update.

to be precise. Linking either in memory or on disk, either pages of the same spreadsheet or independent, either SuperCalc5's files or Lotus® 1-2-3®'s.

Which brings us to the "L" word. SuperCalc5 not only reads and writes Lotus® 1-2-3® files, it totally coexists with Lotus.

Andy's Bunnies

Income Statement

FY Ending January 31, 1991
Unaudited

	This Year	Last Year
Revenue:		
Sales		
Live	$5,778,453	$4,099,672
Dressed	$1,444,775	$677,113
Sales Discounts	($434,990)	($479,124)
Rent-a-Rabbit Fees	$679,991	$324,957
	$7,468,229	$4,612,218
Cost of Sales:		
Opening inventory	$9,662,351	$5,676,712
Purchases	$109,814	$4,229,166
Freight in	$56,727	$43,242
	$9,828,892	$9,949,118
Ending Inventory	$7,334,110	$9,662,351
Cost of materials	$2,494,782	$286,767
Direct labor	$1,447,951	$1,677,243
Employee benefits	$289,590	$335,449
Ranch supplies	$679,444	$610,442
Total Cost of Sales	$4,911,767	$2,909,901
Gross Profit	$2,556,462	$1,702,317
Less selling, general and admin expenses	$469,887	$490,774
Earnings (loss) from operations	$2,086,575	$1,211,543
Other income and expense:		
Interest income	$11,309	$9,765
Other income	$17,899	$15,666
Gain (loss) on sale of fixed assets	($379)	$0
	$28,829	$25,431
Provision for income taxes:		
Current income taxes	$1,043,287	$605,772
Deferred income taxes	$0	$0
	$1,043,287	$605,772
Net earnings (loss) for period	$1,043,287	$605,772

Produce annual-report quality output everyday.

Letting you easily move 1-2-3 macros into SuperCalc5 and back again. Even toggling between menus is a snap for SuperCalc5.

But not for Excel.®

Which now brings us to the "E" word. Unlike Excel, SuperCalc5 runs on all IBM® and compatible computers but also takes full advantage of 286 and 386 machines when *you* decide to make that transition.

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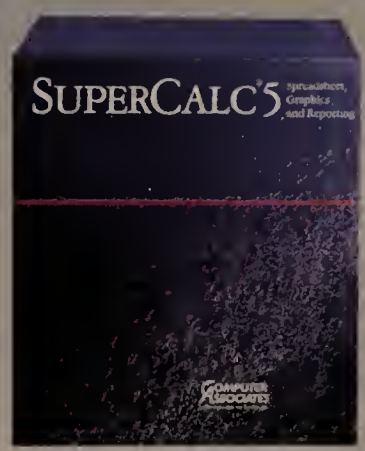

Which finally brings us to our admittedly biased outlook for the much touted spreadsheet war.

With SuperCalc5, peace is at hand.

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Circle 246 on reader service card

WELL-CONNECTED DATA BASES

SQL DATA BASE SERVERS—WITH THE PROMISE OF DAZZLING PERFORMANCE, SOLID SECURITY, AND EASY ACCESS TO CORPORATE DATA—ARE COMING ON STRONG. TRADITIONAL LAN-BASED DATA MANAGERS MAY BE HISTORY.

ERIC BROWN

In the networking gold rush, LAN versions of popular data base management systems (DBMSs) are at best a stopgap measure. Today's solution—adding file and record locking to a stand-alone DBMS—is wearing thin for LAN users. Performance is often slow, and you can't access data on another attached server. MIS chieftains are even more disgruntled. Despite the lure of lower costs, they're hesitant to entrust critical minicomputer and mainframe applications to PC LANs. They fret about chaotic data security and the profusion of programs written in incompatible DBMS languages.

Worry no more. A new genre of data base server packages based on Structured Query Language (SQL) is changing the rules of the game—so much so that corporations are poised to move complex applications from expensive minicomputers to affordable LANs. PC users can enjoy faster performance and greater access to corporate data, and the MIS crowd should be satisfied by more capable security features. If data base servers live up to their promise, minicomputers and traditional LAN-based DBMSs may be things of the past.

SMART SERVERS

The problem with typical multiuser data managers is that each workstation does more than it needs to. With the average LAN pack, the server is a passive receptacle that stores files, while full-fledged data managers on each PC take on all processing and record-locking tasks. Typically, you must copy an entire data base from the server to the PC and process the query locally. In the meantime, other users have to wait in line for that data base.

Data base servers take a more active role. Using a client/server architecture, they divvy up processing chores. The client software on the PC can ask for specific records, letting the server process the query. Because workstation users don't have to copy huge chunks of server data, LAN performance improves, and more data remains unlocked and available to other users. And with a smaller processing burden, client PC users have more RAM (and time) available. You can even get by with low-end ATs, or possibly XTs, at each node, offsetting the additional expense of the server.

Another plus: You don't have to standardize on a single front end. For example, with *SQL Server* from Microsoft, Ashton-Tate, and Sybase, some users will be able to access the server with *dBASE IV*, and others with *Paradox* or *DataEase*. In fact, the front end needn't be a data manager at all. Spreadsheets could call on centralized server data for quick analysis, and word processors could link up for mail merge. Microsoft is preparing a version of *Excel* that will speak to *SQL Server*.

The new breed of servers offer specific benefits to programmers and MIS professionals, too. They enforce strict data integrity rules and advanced, centralized data-locking techniques, so applications are better behaved and data more secure. New transactional commands act like a trail of electronic bread crumbs, letting you roll back discrete updating tasks if errors occur. This level of security is essential for transactional applications such as claims processing, in which the server is bombarded with constant updates and queries. And

programmers will no longer have to add potentially buggy data-integrity and security features to their programs.

With SQL-based servers and the proper communications links, large organizations will be better able to share company data. With most current offerings, you can query multiple linked servers running the same program—and you needn't know where the data resides. Because SQL is spoken by servers, front ends, and most minicomputer and mainframe data bases, you'll soon be able to query larger systems transparently. Yet wide-area distributed processing will require arduous programming. Challenges include reliably updating multiple hosts and translating between the servers' different SQL extensions. Eventually, however, you'll be able to perform relational joins and updates across multiple systems.

CROWDED HOUSE

The data base server field is getting crowded quickly, and the alliances between client and server vendors are Byzantine. In addition to *SQL Server*, data base servers are available from Gupta Technologies (*SQLBase*), Novell (*NetWare SQL*), and XDB Systems (*XDB Server*). OS/2-based servers from IBM, Microrim, Oracle, and possibly Lotus are due by year's end (see "Vendors Draw Battle Lines for SQL Data Base Servers," *Industry Outlook*, *PCW*, July 1989).

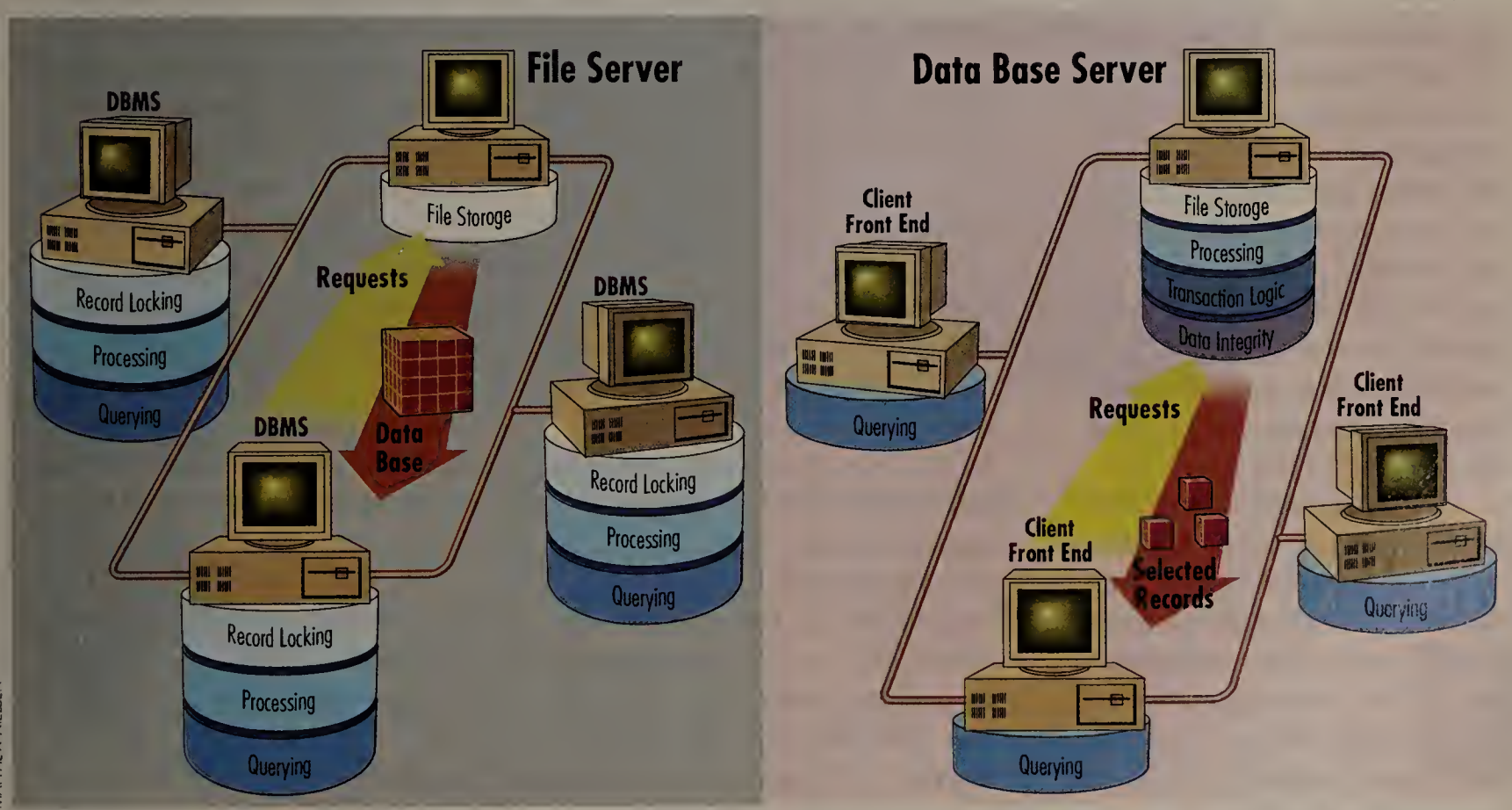
SQL Server, based on *OS/2 LAN Manager*, may be the server to beat. *PC World*'s evaluation of a beta version revealed swift performance and advanced security and transactional logic (see "SQL Server: LAN-Tailored Data Management," *PCW*, April 1989).

Microsoft can expect tough competition from IBM and Oracle, especially among LANs that need to link up to larger systems. Big Blue's *OS/2 Database Manager*, an extension of its OS/2 Extended Edition, is due in the third quarter. Oracle's *Oracle LAN Server*, due by the end of the year, promises links to Oracle data bases on DEC VAX and UNIX platforms. Meanwhile, Novell's *NetWare SQL* should eclipse Gupta's lead among DOS-based LANs.

CLIENT CONFIDENTIAL

The market for front ends is even more competitive than the server arena: Every major data base company promises a SQL version that will support one or more of the servers—most are due by year's end.

Adding server support is no easy trick. Each front end must provide specific support for the Application Progamming Interface (API) and the server's SQL extensions. One of the thorniest issues is how to translate between native data base lan-



MATTHEW NIELSEN

DATA BASE SERVERS VERSUS FILE SERVERS. New SQL-based data base servers can improve data management performance by taking on processing and other tasks that would be handled by each PC on a traditional file server–based data manager. Because the server processes queries and returns smaller subsets of data, LAN performance is boosted and more data is accessible to others.

Servers and Clients: Complex Alliances

Every major data base vendor has announced front-end support for one data base server or another. And the roll call has only begun—expect spreadsheets, word processors, and other applications to follow suit.

Company	Server	Platform	Key front-end support
EXISTING SERVERS			
Gupta Technologies	SQLBase	DOS, OS/2	dBXL/Quicksilver Paperback Software Advanced Revelation
Novell	NetWare SQL	NetWare	Paradox dBXL/Quicksilver FoxPro Advanced Revelation XQL (Novell)
XDB Systems	DBX Server	DOS	XDB-SQL
Microsoft/ Ashton-Tate/ Sybase	SQL Server	OS/2	dBASE IV Paradox DataEase Advanced Revelation Clipper
ANNOUNCED SERVERS			
IBM	OS/2 Database Manager	OS/2	IBM OS/2 Extended Edition Paradox DataEase Advanced Revelation dBASE IV
Oracle	Oracle LAN Server	OS/2	Oracle Professional Paradox dBXL/Quicksilver Advanced Revelation
Microrim	Atlas	OS/2	Atlas R:base

guages and SQL. Slow or tedious transactions could negate the server's performance edge.

Because SQL is a set-oriented language, working with tables of data rather than records, set-oriented programs such as *Paradox* and *DataEase* should prove to be natural front ends. With an upcoming SQL version of *Paradox 3.0*, you'll make queries as you would in the stand-alone version, by checking off requests on a query-by-example (QBE) table. If the data resides on the server rather than on the local drive, the program will automatically translate the request into SQL, ask the server to process it, and return the answer set. *DataEase SQL* will use a similar set-oriented process, based on its form-querying function.

Due to the record-oriented nature of dBASE, dBASE compatibles have a rougher time of it. Each product takes a different tack, and each has its problems. *dBASE IV* lets you choose between a SQL and a dBASE command set, but if you choose dBASE, all data must be translated twice, since the answer arrives in *dBASE* form. Version 1.1 of *dBASE IV* should streamline this process, offering QBE queries for *SQL Server*. With the *dBXL* and *Quicksilver* versions for *Oracle LAN Server*, WordTech has devised a hybrid SQL/dBASE language. It supports Oracle's SQL extensions, but some dBASE commands no longer function. Fox Software's upcoming *FoxPro* data manager will support *FoxServer*, Fox's OEM version of *NetWare SQL* due this winter. *FoxPro*'s language will combine full SQL and dBASE command sets. Although thorough, the language may prove unwieldy.

Microrim's upcoming *Atlas* front end may offer the best solution, pointing to a future in which front ends will be light, flexible tools rather than extensions of complex stand-alones. Using a graphics-based Presentation Manager interface, the *Atlas* front end is designed specifically for the *Atlas* server. Rather than perform translations locally, the server will handle QBE-to-SQL translations, freeing up the front end for other tasks.

ARE YOU READY?

Who needs a data base server? If your office is dedicated to transactional tasks with frequent updates, such as accounting applications, a data base server makes good sense. It's faster and more secure than a LAN file server and cheaper and more flexible than a minicomputer. Banks, insurance companies, and airlines should be ready customers, as should mail-order, manufacturing, and retail firms.

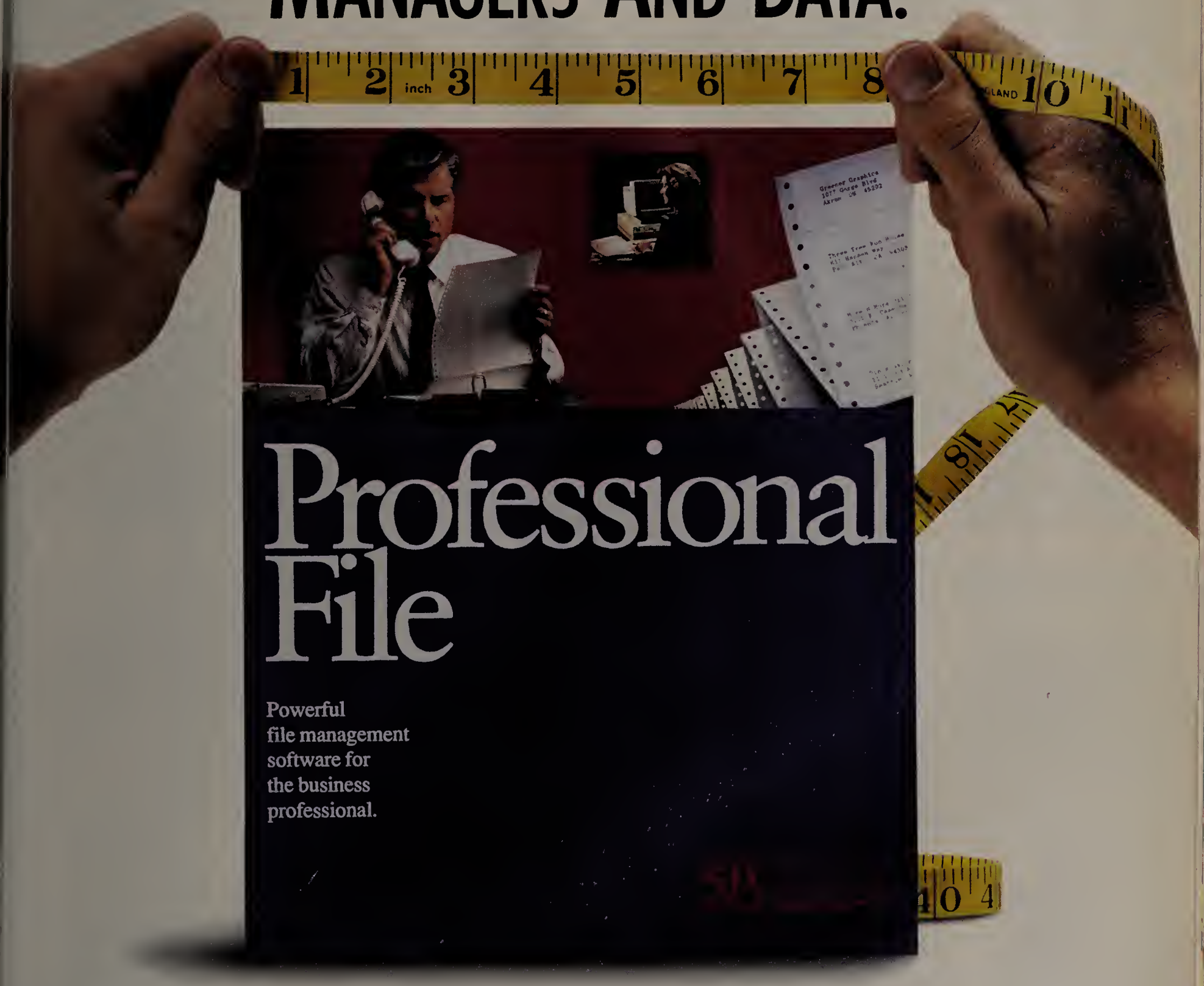
Data base servers aren't limited to transactional tasks. Any large, busy LAN should enjoy considerable performance gains, and servers are a good solution for departments that want the freedom to choose a variety of application packages to access the same data.

Still, the new servers aren't for everybody—they'll require deep pockets and heavy support. You may need to dedicate a multi-megabyte 386 to data base server tasks. Programmers will need to rewrite applications, and LAN administrators will have their hands full fine-tuning and monitoring.

Still, the benefits are clear for transactional environments and for any LAN user who's tired of waiting in line for data. ●

Eric Brown is an associate editor for PC World.

THE SHORTEST DISTANCE BETWEEN MANAGERS AND DATA.



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Circle 227 on reader service card

Businesses large and small are discovering that a company BBS can improve communications dramatically. And renting space on an existing board is a cheap way to get started.

THE BUSINESS BBS:

BETTER COMMUNICATION ACROSS THE BOARD

William Rodarmor

Information may be power, but not if you have to play phone tag to pass it on. That's why businesses that communicate with remote offices, send files and messages internally, or provide customer support rely heavily on courier services and electronic mail. But increasingly they're also using the hacker's conversation piece—the electronic bulletin board (BBS).

Many companies happily run their own bulletin boards, both large and small. Others have discovered that by renting investment space on a commercial board, they can try the BBS idea for a minimal investment. It comes down to a matter of certainty: Unless you have a pretty good idea of what a BBS will do for your company, you're better off renting; you can always move up later on if the BBS pans out.

The Mechanics of Modem Access

Like E-mail, a BBS cuts down on waiting time. Instead of idling on the phone, a user can summarize a problem, send it in, and get a well-researched answer the next day. But only on a BBS can you post the exchange publicly so others can read and use the information.

A number of local area network packages offer BBS-like capabilities, but a true BBS is a remote affair. For strictly internal communications, bulletin boards work best at companies with widely distributed offices and plenty of PCs, modems, and communications software in each office. BBSs open to the outside world—for customer support, say—naturally require modem-toting customers (which explains why BBSs are so popular with computer companies).

In setting up your own BBS, you can choose from such solid, ready-to-use packages as

DON GLENTZER

RBBS-PC, TBBS, Fido, and dozens of others. A business-oriented BBS should be accessible to more than one user at a time and for quick response requires an AT or better as host. But the most important thing to know about running your own BBS is that it takes time. Even if the board is for internal company use only, someone has to fix files and tweak the hardware.

The Merits of Renting

If you like the idea of a BBS but don't want the hassle of setting it up yourself, commercial BBS operators will gladly rent you a space on their boards, often called a restricted access area. Renting saves you the investment in hardware, software, and maintenance. As a bonus, your users gain access to whatever other services the commercial operator may have to offer.

For example, Bob Mahoney runs Exec-PC, a 90-phone-line BBS for hire in Shorewood, Wisconsin. Exec-PC charges a company $2400 a year for a private area on its board. For $60 a year, users with full access rights can not only communicate with the company but also participate in 30 public forums and download files from 50,000 shareware, public-domain, and demo programs for PC, UNIX, Macintosh, and Amiga systems.

Out on New York's Long Island, ten phone lines are alive with The Sound of Music (SOM), Paul Waldinger's BBS. A tireless BBS promoter, Waldinger has attracted such companies as Hayes, WordPerfect, Quarterdeck, and AST to his board. Like Exec-PC, The Sound of Music can ease the sting of maintaining a busy BBS yourself. SOM charges companies that use the public-access phone line $5000 a year. If you want a private number—which you can include in your advertising—the yearly cost climbs to $10,000. Users pay $75 a year.

Coke's Nationwide Network

Four years ago, the folks at Coca-Cola Foods in Houston decided there could be more to communication than refreshing pauses out in the hallway. "We were playing massive phone tag trying to keep in touch with our sales managers," says hacker-turned-MIS-manager Cheryl Currid. The company needed to swap sales data and spreadsheets fast, but it didn't have E-mail and was spending a fortune on courier services.

So Currid got a couple of ATs, a pair of Hayes modems, and a copy of a userware BBS program called *RBBS-PC.* Today the nationwide network links 17 regional sales departments and a couple of plants and carries 3000 messages and 3500 files a year. "The BBS has saved us more than $300,000 in courier and express charges over the last four years," says Currid, "yet it hasn't needed maintenance in a year and a half."

Despite her enthusiasm, Currid advises approaching a BBS project carefully. Spend time with the documentation, and be prepared for long hours at the BBS's front end. For example, she says, *RBBS-PC* runs right out of the box, but you have to flip a lot of switches to use its many advanced features. "We had to choose 70 or 80 communications parameters," says Currid. "You have to decide things like how many times the phone should ring before the BBS picks it up. It's tedious, but you only have to do it once."

A Cottage BBS at Computer Associates

Even a small company BBS can pay dividends without a big investment in time or equipment. While the Coca-Cola Foods BBS zips spreadsheets across the country, an unattended XT in a home in El Cajon, California, takes three calls on a good day. The XT belongs to Michael Reaves, a software engineer who works at Computer Associates, 30 miles away in San Diego. Computer Associates has 6000 employees and recently passed the billion-dollar mark in gross sales. But it doesn't spend a dime on Reaves' little bulletin board. And neither does anyone else.

"It's a freelance project," Reaves says. "I set it up because of the number of technical questions I was getting." He directs his callers to the BBS to download tips, technical pointers, or handy utilities from the XT's 130MB hard disk. An unattended cottage industry, Reaves' BBS projects a kind of down-home simplicity; it doesn't even have special

Cheryl Currid (left), an MIS manager at Coca-Cola Foods in Houston, created an internal BBS linking 17 offices nationwide. Systems Analyst Tim Stevenson (below) saved his company $45,000 a year by switching from a public E-mail service to a local commercial BBS.

MICHAEL SEARS

To better handle technical queries in his job at Computer Associates in San Diego, Michael Reaves runs a tiny 30-user BBS from his home.

BBS software. Instead, Reaves uses ProComm Host, a script file included in Datastorm's *ProComm Plus.*

Calyx: Bypassing the BBS

Despite the Coke and Computer Associates success stories, a BBS can be an uncertain venture. And a smart company knows enough to shift its resources when things don't work out. Renting space on an existing BBS makes sense when you can't predict the amount of traffic. That wisdom won't be lost on Calyx Corporation, a high-tech Wisconsin company that sells medical and dental software. Two years ago, the firm was considering creating its own BBS. In what may prove to have been a smart move, it gave the job to Exec-PC instead.

"The bulletin board hasn't been used as much as we'd hoped," says Barbara Schnoll, Calyx's marketing director. "We promoted it, but there hasn't been a lot of interest." The BBS has been a bust because Calyx's other support strategies make it redundant. Calyx has a very strong newsletter, Schnoll says, offers free reseller support, and responds to questions within 4 hours. The flow of information at Calyx is so good, nobody needs the BBS.

Investment Dynamics Quits CompuServe

You can set up a company forum on a large public E-mail system like CompuServe or The Source, but setup and on-line charges can be steep. "We had been using CompuServe, but the cost was incredible," says Tim Stevenson, a systems analyst with Investment Dynamics Corporation. A financial management group in Hartland, Wisconsin, Investment Dynamics issues daily investment advice to its 60 clients, mainly banks and savings and loan associations. Its BBS needs are somewhat unusual: Every morning between 8 and 8:30, the company uploads a single sheet of advisory information; after 8:30, the customers call in and download it.

Initially, the company created its own forum on CompuServe, but when Stevenson saw the costs, he began to have doubts. "Our subscribers would call in on toll-free numbers, which we were paying for," he says. "Also, CompuServe billed us for all the messages posted, whether they were picked up or not." After a year and a half, Investment Dynamics' CompuServe tab was hitting $4000 to $5000 a month. Switching to Exec-PC in 1988 paid off: Stevenson figures the changeover saves the company close to $45,000 a year.

Look Before You Leap

If you want a bulletin board for strictly internal use, setting up your own will produce a system attuned to your company's particular needs. For customer support and public information, it's wise to rent space on an existing board, at least for starters. Predicting BBS usage is next to impossible, and by using someone else's board, you can test the waters without getting more than your feet wet. ●

William Rodarmor is an assistant editor for PC World.

WHERE TO BUY

Fido/FidoNet 12
Fido Software
164 Shipley
San Francisco, CA 94107
415/764-1688, 415/764-1629 (BBS)
LIST PRICE: $175, upgrade $50
REQUIREMENTS: 150K, DOS 2.0 or later version
Reader service no. 601

ProComm Plus 1.1b
Datastorm Technologies
P.O. Box 1471
Columbia, MO 65205
314/449-9401, 314/474-8477 (BBS), 314/474-9195 (fax)
LIST PRICE: $89
REQUIREMENTS: 192K, DOS 2.0 or later version
Reader service no. 602

RBBS-PC
Capitol PC User Group
P.O. Box 6128
Silver Spring, MD 20906-6128
301/762-6775, 703/978-6360 (tech support BBS)
LIST PRICE: $16
REQUIREMENTS: 384K, two disk drives (hard disk recommended), DOS 2.0 or later version
Reader service no. 603

TBBS 2.1
eSoft, Inc.
15200 E. Girard Ave. #2550
Aurora, CO 80014
303/699-6565
LIST PRICE: 1-line version $299.95, 16-line version $895, 32-line version $1495
REQUIREMENTS: 512K, two disk drives (hard disk recommended), DOS 2.0 or later version
Reader service no. 604

Exec-PC
P.O. Box 11268
Shorewood, WI 53211
414/963-2880, 414/964-5160 (BBS)
COSTS: $2400/year per company; user registration $60/year
Reader service no. 605

The Sound of Music
269 Wakeno Ave.
Oceanside, NY 11572
516/766-6811, 516/536-8723 (BBS)
COSTS: $5000/year per company (with private-access line $10,000/year); user registration $75/year
Reader service no. 606

ROBERT BURROUGHS

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386™ performance at a price you'd expect from a 286 system.

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The Intel® 80386SX microprocessor combines the ability to operate high-performance 80386 based software, as well as current 80286 and 8088 based software. You get the combination of 32-bit performance with 16-bit hardware compatibility.

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Built-in VGA graphics give you beautifully detailed, high-resolution displays. Add a color analog monitor and create astonishing graphics using a palette of 256,000 colors for near-photographic clarity.

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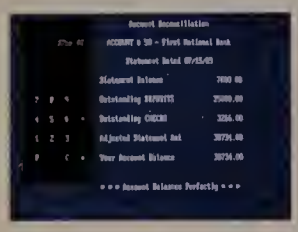
MS/licensed from Microsoft Corp.

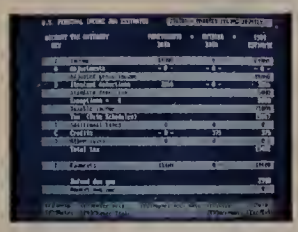
Circle 263 on reader service card

MONEYCOUNTS 6.0

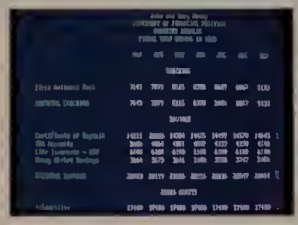
FROM PRICE TO PERFORMANCE . . . THERE'S SIMPLY NO COMPARISON!



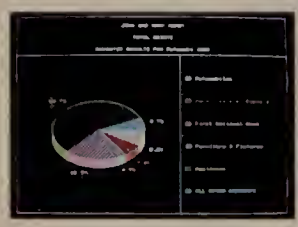
MONEYCOUNTS' smart account balancer makes fast work of even the toughest bank statements.



MONEYCOUNTS' integrated Tax Estimator helps you quickly size up your federal tax situation.



All reports can be displayed to screen and easily viewed using vertical and horizontal title locking.

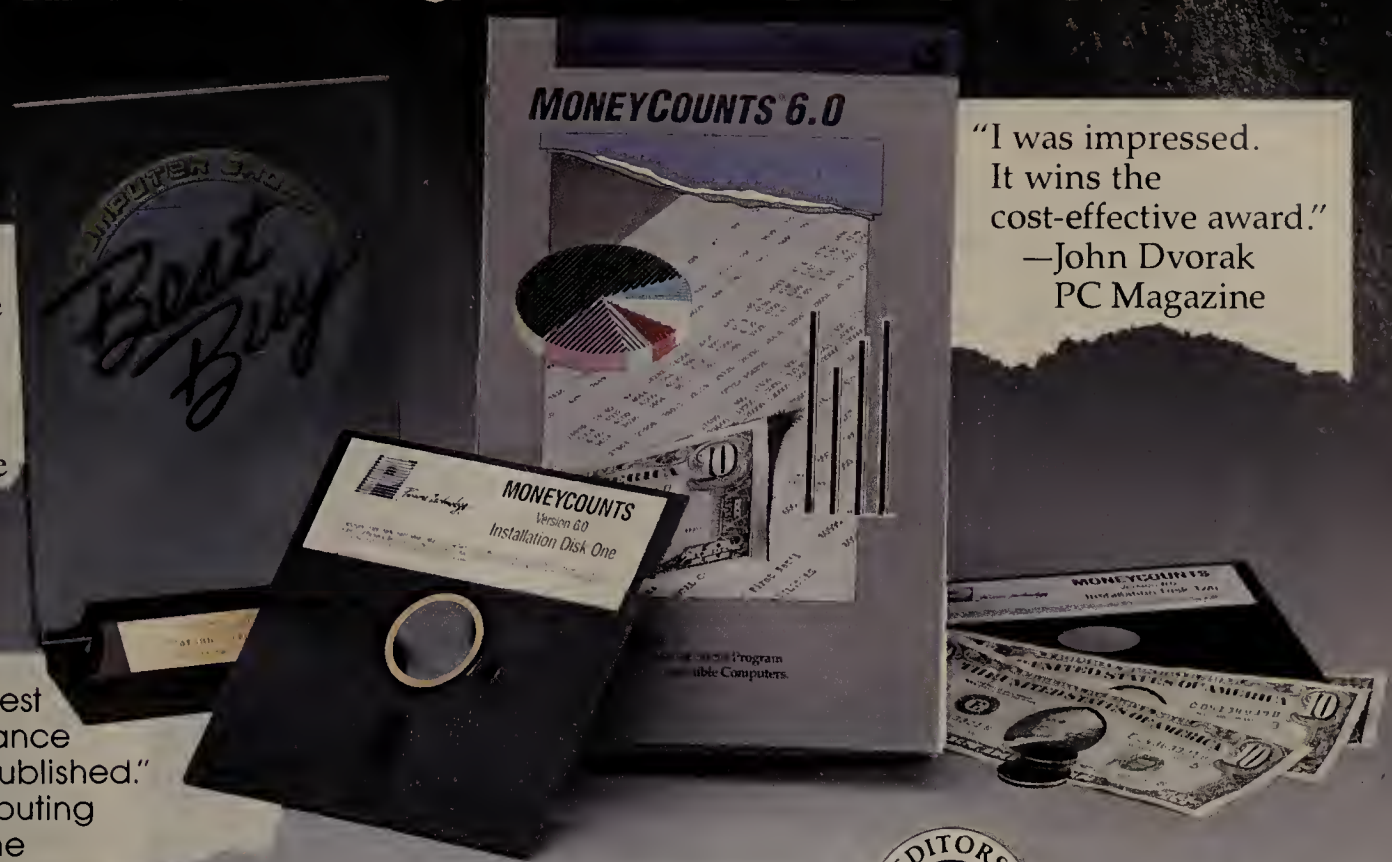


Three dimensional pie charts and bar charts let you quickly visualize your complete financial picture.

	MONEYCOUNTS*	QUICKEN*	MANAGING YOUR MONEY*	DOLLARS & SENSE*
Version	6.0	2.0	5.0	3.1
Manufacturer	Parsons Technology	Intuit, Inc.	MECA Ventures, Inc.	Monogram Software, Inc.
Suggested Retail Price	**$35.00**	**$49.95**	**$219.98**	**$179.95**
Account Balancer	YES	YES	YES	YES
Automatic Error Finder	YES	NO	NO	NO
Accounts Can Be Added When Entering Transactions (Data)	YES	YES	YES	NO
Budgeting	YES	YES	YES	YES
Variable Budgeting By Month	YES	NO	YES	YES
Financial Reports				
Actual Financial Results	YES	YES	YES	YES
Month and Year to Date	YES	YES	YES	YES
All Months On One Report	YES	YES	YES	YES
Budgeted Financial Results	YES	YES	YES	YES
Actual Compared to Budget	YES	YES	YES	YES
Actual Compared to Prior Month	YES	NO	NO	NO
General Ledger Report	YES	YES	NO	NO
Accountant's Trial Balance	YES	NO	NO	NO
Net Worth Computation	YES	NO	YES	YES
Inquiry Reports				
Check and/or Deposit Register	YES	YES	YES	YES
Account Analysis	YES	YES	YES	YES
All Transactions with Party	YES	YES	YES	YES
Cash Requirements Forecast	YES	YES	YES	YES
Aged Invoices Payable	YES	NO	YES	YES
Reports Export to Lotus or Quattro	YES	NO†	YES	YES
Graphics	YES	NO	YES	YES
Bar Charts	YES	NO	YES	YES
Pie Charts	YES	NO	YES	NO
Fiscal Year Support	YES	NO	YES	YES
Optional Password Protection	YES	NO	NO	YES
Financial Calculator	YES	NO	YES	YES
Prints Amortization Schedules	YES	NO	YES	YES
Prints Accumulation Schedules	YES	NO	YES	YES
Mail List Manager	YES	NO	YES	YES
Prints Address Labels and Index Cards	YES	NO	YES	YES
Prints Telephone Directory	YES	NO	YES	NO
Mail Merge with Word Processor	YES	NO	YES	YES
Check Writer	YES	YES	YES	YES
Prints Laser Checks	YES	YES	YES	NO
Prints Any Pin-Feed Check	YES	NO	YES	YES
Personal Income Tax Estimator	YES	NO	YES	YES
Pop-up Note Pad	YES	NO	YES	YES
Pop-up Math Calculator	YES	NO	YES	YES
Capacity				
Total Number of Accounts Per File	999	300	**	120
Total Number of Open Transactions	100,000	65,535	**	4,000

*Trademarks of their respective manufacturers. †Available for additional $19.95. **Varies based on RAM memory and disk space available.

ANNOUNCING THE NEW $35 MONEY MANAGEMENT SOLUTION...



"Comes with perhaps the friendliest user interface of any financial program . . . an excellent value."
—Compute! Magazine

"I was impressed. It wins the cost-effective award."
—John Dvorak
PC Magazine

"One of the best personal finance managers published."
—PC Computing Magazine

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"MONEYCOUNTS is one of the finest examples of just how good inexpensive software can be."
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EDITORS' PCM CHOICE AWARD

We invite you to examine MONEYCOUNTS. ***It's the clear choice for home and business.*** MONEYCOUNTS is CPA designed, easy-to-use, menu-driven with on-line help, and requires no accounting experience. You'll appreciate the ease with which MONEYCOUNTS . . .

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- Prints general ledger and accountant's trial balance.
- Lets you optionally save any report to disk or display it on screen. ***You can even export directly to Lotus 1-2-3*, or Quattro.****
- Prints any type of pin feed (or laser) check.
- Handles up to 999 accounts and 100,000 transactions a year.
- Estimates your personal income tax.
- Links directly with the *PERSONAL TAX PREPARER* software.
- Analyzes financing options & savings programs — computes interest rates & loan payments — prints amortization and accumulation schedules.
- Manages mail lists — prints labels and index cards.
- Displays and prints three dimensional graphics (both pie charts and bar charts).
- Provides password protection, fiscal year support, pop-up notepad, pop-up calculator, DOS shell, automatically backs up your data files and much more.

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CARD # _____ EXP. DATE _____

MONEYCOUNTS 6.0 requires an IBM*/Tandy*/Compaq* or compatible computer, 384K or more RAM, DOS 2.0 or higher, 2 disk drives (or a hard disk). Works with all printers and monitors. Add $10 shipping/handling outside North America. Iowa residents, please add 4% sales tax.

*Lotus 1-2-3, Quattro, IBM, Tandy and Compaq are all registered trademarks of Lotus Development Corp., Borland International, Inc., International Business Machines Corp., Tandy Corp and Compaq Computer Corp. respectively.

POWER TOOLS FOR PROGRAMMERS

BASIC and Pascal programmers need all the help they can get. This collection of editors, tool kits, debuggers, and other utilities can shift your productivity into overdrive.

MATT LAKE AND SCOTT SPANBAUER

Programming is a complex art; any tool that makes the work easier is bound to win fans. Witness the success of interactive, menu-driven compilers like *Turbo Pascal* and *QuickBASIC* that integrate a basic editor and debugger. For students and occasional programmers, those built-in tools suffice.

But if it turns out that programming is your passion—or worse, part of your job—a few hours with a $99 integrated programming environment will expose the package's limits. The compiler may be great, and the editor and debugger may offer enough features for crafting small, single-unit programs, but when programs get big and ugly you need industrial-strength tools to keep from getting bogged down.

The most important tool—the hub of all coding activity—is the programming editor. The editors listed here naturally offer basic word processing features such as text wrap, line space and margin adjustments, search and replace, and printing. But it's the extras such as automatic indentation and punctuation matching (which automatically enters closing parentheses and quotation marks) that make pounding out source code for even long programs a breeze. You'll find that most of the editors listed here also let you edit programs for any compiler and often let you launch your compiler or debugger from within the editor.

When you're writing programs, there's no need to reinvent the wheel. Tool kits—libraries of tested routines—give your code a professional boost without forcing you to learn the intricacies of sequential file access or graphics screen I/O. These fast, bug-free data handling routines and sophisticated but friendly interfaces will keep your users coming back for more. Though the libraries often cost more than your compiler, they can cut hours from your programming time.

Debuggers, the third crucial programming tool, are software detectives that help you hunt down and correct errors in your code. A superior debugger should not only handle BASIC, Pascal, and C programs but also tackle TSRs and graphics. When you put your errant program under the magnifying glass, the best debuggers let you execute it a line at a time, skip over certain routines, and open every factor for inspection, from data arrays to memory registers.

Other utilities can patch the holes in the process, especially MAKE programs, which automate compiling and linking of multiple–source-file programs. But choose carefully: Some MAKE utilities support many compilers and handle complicated dependencies; others don't. As with any programming tool, call the vendor and make sure your compiler and the vendor's package will make a good match.

PROGRAM EDITORS

Brief 2.1 comes with a macro library, specialized format templates for Pascal and C, and an undo feature that can reverse 300 steps. You can edit multiple files at once and launch your compiler without exiting the editor. List price: $195.
Reader service no. 715

Ed Editing System places no limit on the number of files users can open, sorts and justifies text, and offers spreadsheet-level math functions. Its search and replace commands support *regular expressions*, a UNIX text-pattern–matching convention. List price: $265, Programmers' Edition with C source code and libraries $365.
Reader service no. 716

Edix 7.0 comes with a macro processor and offers multiple views of one or more files. The program also features on-line help, some formatting features, and a regular expression search and replace command. List price: $195.
Reader service no. 717

EDT+ 4.0 emulates the VAX EDT editor and offers on-line help, search and replace, cut and paste, and a programmable undelete function. *EDT+* can edit 80 documents simultaneously; lines may be 511 characters long. List price: $295, LAN version $1995.
Reader service no. 718

Epsilon 4.0 runs mostly in expanded memory, leaving room for your compiler. A C-like macro language comes with a macro library. The program features multilevel undo and redo (namely, undoing an undo) and context-sensitive help; it can scan for error messages from any compiler. List price: $195.
Reader service no. 719

Kedit 4.0 allows 15 open files and multiple views of a single file. *Kedit* supplies basic formatting and word processing features, macros, and a search and replace function that supports regular expressions. List price: DOS version $150, OS/2 version $175.
Reader service no. 720

ME Text Editor can open multiple windows on one or more files and offers on-line help and a library of more than 100 macros. Word processing features include bookmarks, parenthesis matching, undo and redo, and regular expression search and replace. List price: $89, with source code $189.
Reader service no. 721

MKS Vi works with only one file at a time. Features include automatic indentation, abbreviation mode, keyboard macros, and regular expression search and replace. You can tag a line of C code and return to it later, a function that be customized for other languages. List price: $149.
Reader service no. 722

Multi-Edit 4.0 combines word processing and macro features and, unlike most editors, features context-sensitive help. You can view multiple windows on one or more files, undo and redo up to 32,000 steps, and search for and replace regular expressions. The Professional version contains full macro source code, communications software, and a spelling checker. List price: $99, Professional version $179.
Reader service no. 723

TOM LOCHRAY

The Norton Editor 1.3C offers split-screen editing of one or two files; lines can be as long as 64,000 characters. Key features: on-line help, punctuation matching, and automatic indentation. A memory-resident utility records up to 1000 keystrokes. List price: $75.
Reader service no. 724

Pi 3.0 offers punctuation matching and regular expression search and replace. Supplied macros can complete CASE, IF, and other statements. *Pi* offers context-sensitive help and can swap data to disk when editing large files. List price: $195.
Reader service no. 725

Slick 1.05 supplies 4000 lines of macro code and plenty of formatting and editing features, including indenting and command expansion shortcuts for C and Pascal. *Slick* can open multiple windows on one or more files and offers non-context-sensitive help. List price: $195.
Reader service no. 726

SPF/PC is the DOS equivalent of the ISPF/PDF mainframe-based editor that offers basic word processing features and wild-card searching. It can tap extended and expanded memory for large files and open unlimited files, although only two can be visible at once. List price: $245.
Reader service no. 727

Vedit Plus 3.1 can handle large files—up to 37 at a time—with lines 16,000 characters long. It comes with a tutorial and context-sensitive help. Advanced capabilities include parenthesis matching, regular expression search and replace, a macro language, and multiple-level undo commands. List price: $185.
Reader service no. 728

Vq 1.31 runs in as little as 7K, so you can compile without quitting the editor. *Vq* can open 64 files and 16 windows at one time. It offers auto indent, regular expression search, automatic save, and multilevel undo. An included library contains macros that complete C and Pascal IF and FOR statements. List price: $270.
Reader service no. 729

For more information about all products in this section, circle reader service no. 904.

PROGRAMMERS' UTILITIES

MAKE Utilities

Lugaru Make supports macros and works with any DOS or OS/2 compiler, assembler, or linker. List price: $69.
Reader service no. 730

MKS Make 2.4, a DOS equivalent of UNIX System V's AUGMAKE, is compatible with most BASIC and Pascal compilers, librarians, and linkers. List price: $149.
Reader service no. 722

Opus Make runs in as little as 3K and also contains Opus MKMF, a makefile and dependency generator. List price: $79.
Reader service no. 732

DEBUGGERS

● yes ○ no

VENDOR Product	Compilers or files supported	Breakpoint types	Trace-back	Single-step through subroutine	Debugs TSRs and interrupt service routines	Debugs graphics	80386 SUPPORT: Uses debug registers	80386 SUPPORT: Runs in virtual 8086 mode	80386 SUPPORT: Debugs coprocessor	List price	Reader service no.
BORLAND INT'L Turbo Assembler/ Debugger	any .COM, .EXE, or .MAP file	permanent, conditional, 386 hardware interrupt	○	●	deficient[1]	●	●	●	●	$150	740
MICROWAY 87 Debug 1.22	any .COM, .EXE, or .MAP file	permanent, temporary, conditional	○	●	○	○	○	○	●	$150	741
MORGAN COMPUTING Advanced Trace 86	any .COM, .EXE, or .MAP file	permanent, temporary, conditional	●	●	deficient[2]	●	○	○	●	$175	742
NU-MEGA TECHNOLOGIES Soft-ICE 2.0	any .COM, .EXE, or .MAP file	conditional, hardware/ software	●	●	●	●	●	●	○	$386	743
PHOENIX COMPUTER PRODUCTS Pfix86 Plus	any .COM, .EXE, or .MAP file	permanent, temporary, conditional	○[3]	●	●	●[4]	○	○	●	$395	744
TURBOPOWER SOFTWARE T-Bug Plus 4.0	TP 4.0	permanent, temporary	○	●	○	●	○	○	●	$45[5]	745
VISUAL AGE Codesmith 86	MASM, MC, MP, MF	conditional	●[6]	●	●	●	●	●	○	$145	746

MASM = Microsoft Assembler
MC = Microsoft C
MF = Microsoft Fortran
MP = Microsoft Pascal
TP = Turbo Pascal 4.0, 5.0, 5.5

[1]Only interrupt service routines.
[2]Only TSRs.
[3]Maintains a log.
[4]Not for EGA high-resolution graphics.
[5]Includes source code.
[6]Traces back one step to end of last session.

For more information about all products in this section, circle reader service no. 906.

PolyMake 3.0 recognizes file dependencies and tracks the date and time of revisions. List price: $149.
Reader service no. 733

Seidl Make Utility 3.01 (SMK) handles complicated dependencies and shares wide support for compilers, librarians, linkers, and assemblers with dependency-generating sidekick *SMKgen*. List price: SMK $99.95, SMKgen $99.95.
Reader service no. 734

Slick Make provides two automatic include files that define macro constants and rules for modules. In-line link response files allow a single make-file for both DOS and OS/2 executable files. List price: $89.
Reader service no. 726

On-Line References

The Norton On-Line Programming Guides are context-sensitive or indexed pop-up help data bases for most versions of BASIC, Turbo Pascal, C, and assembly language, as well as the OS/2 API. You can restrict help to half a window to keep your code in view. List price: with one data base $100, OS/2 version $150, each additional data base $69.
Reader service no. 724

Peabody Reference Guides come in many flavors, including MS-DOS, Turbo Pascal, MASM, Microsoft C, and Turbo C. They offer pop-up help either in indexed menus or based on your current context. You can customize *Peabody*'s data bases with your own help screens. List price: with one data base $100, each additional data base $50.
Reader service no. 737

Other Tools

Logic Gem includes three tools that convert logic tables into BASIC, Pascal, C, Fortran, or dBASE code. The logic editor—a spreadsheetlike decision table—organizes and fills in logical steps. A logic interpreter tests and makes prototypes from the decision table. Finally, the logic compiler translates the completed decision table into source code. List price: $198.
Reader service no. 738

Stay-Res Plus 3.0 turns BASIC or *QuickBASIC* routines into memory-resident programs you can pop up with a hot key. The necessary place-holder file can take up as little as 11K of RAM. List price: $89.
Reader service no. 739

For more information about all products in this section, circle reader service no. 905.

Matt Lake is an editorial assistant and Scott Spanbauer an assistant editor for PC World. ●

TOOL KITS

● yes ○ no

VENDOR / Product	Compilers supported	Type	Run-time fee	Source code included	Source code commented	Examples included	Error handling	Reentrant	List price	Reader service no.
BLAISE COMPUTING										
Pascal Tools & Pascal Tools 2	MP	general	○	●	●	●	●	●[1]	$149	748
Turbo Power Tools Plus 5.0	TP	general	○	●	●	●	●	●[1]	$175	747
BORLAND INT'L										
Turbo Database Toolbox	TB, TP	data base	○	●	●	●	●	●	$100	740
Turbo Editor Toolbox	TB, TP	editor	○	●	●	●	●	●	$100	740
Turbo Pascal Graphics Toalbox	TP	graphics	○	●	●	●	●	●	$100	749
Turbo Pascal Numerical Taolbox	TP	numerical	○	●	●	●	●	●	$100	749
COURSEWARE APPLICATIONS										
Drawbridge for BGI	TP, TC	graphics editor	○	○	n/a	●[1]	●	○	$89	750
Drawbridge for MetaWindows	MP, MC[2]	graphics editor	○	○	n/a	●[1]	●	○	$189	750
CRESCENT SOFTWARE										
Graphpak	MB, TB, QB	graphics	○	●	●	●	○	○	$79	751
Graphpak Professional	MB, TB, QB	graphics	○	●	●	●	●	○	$149	751
Quickpak	MB, TB, QB	general	○	●	●	●	○	○[3]	$79	752
Quickpak Professional	MB, TB, QB	general	○	●	●	●	●	○	$149	752
CONNELL SCIENTIFIC GRAPHICS										
Enhanced Graphics Toolkit	TP, TC, QB, QC, MC, MF	graphics	○	●	●	●	○	○	$245	753
DIGITAL RESEARCH										
GEM Programmer's Toolkit	Lattice C, MP, TC, MF	general	$5/unit	○	n/a	●	●	○	$500	754
GRAPHIC SOFTWARE SYSTEMS										
Graphics Development Toolkit	MB, MP, MC, TC	graphics	$6-$55/unit	○	n/a	●	●	●	$595	755
HAMMERLY COMPUTER SERVICES										
ProBas Programming Library	QB; MB 2.0, 6.0	general	○	●	●[1]	●	●	○	$135	756
KOMPUTERWERK										
Finally	MB, TB, QB	general	○	●	●	●	●	○	$99	757
KRIS JAMSA SOFTWARE										
Turbo Pascal Toalbox	TP	general	○	●	●	●[1]	●	●	$64	758
MAX SOFTWARE CONSULTANTS										
dp_Max	TP	data base	○	●[4]	●	●	●	●	$149	759
MEDIA CYBERNETICS										
Halo88 Developer's Toolkit	MB, QB, TB, MP, TP	graphics	●[5]	○	n/a	●	●	○	$325	760
Image-Pro Developer's Toolkit	MP, MASM, C, MF	graphics	●[5]	○	n/a	●	●	○	$995	760
METAGRAPHICS SOFTWARE										
TurboWindow/Pascal	TP	window	○	○	n/a	●	●	○	$95	761
MetaWindows	MP, TP, MC, TC, QC	window	○	○	n/a	●	●	○	$195	762
MetaWindows/Plus	MP, TP, MC, TC, QC	window	$2000	○	n/a	●	●	○	$295	762
MetaWindows/Premium	MC, TC	window	$3000	○	n/a	●	●	○	$495	762
NOSTRADAMUS										
Turbo Plus	TP 5.0	general	○	○[6]	n/a	●	●	●	$150	763
THE RESEARCH GROUP										
Tapaz	TP	data base	○	○[6]	n/a	●	●	●[1]	$50	764
SIMPLESOFT										
FlashPac	TP, TC	general	○	●	●	●	●	○	$50	765
SOFTWARE ARTISTRY										
PC Expert 2.0	TP, MC, M2	general	○	○[7]	●	●	●	○	$199	766
PC Expert Professional	TP, MC, M2	general	○	○[8]	●	●	●	○	$495	766
SOPHISTICATED SOFTWARE										
Turbo Magic 2.1	TP	general	○	○	●	●	●	○	$199	767
STERLING CASTLE										
BASIC Development Tools	IBMB, GWB, QB, TB	general	○	●	●	●	○	●	$198	768
TRUE BASIC										
True BASIC Developer's Toolkit	True BASIC	general	○	●	●	●	○	○	$70	769
TURBOPOWER SOFTWARE										
Turbo Professional 5.0	TP	general	○	●	●	●	●	○	$125	770

GWB = GW BASIC
IBMB = IBM BASIC
M2 = Modulo 2
MASM = Microsoft Assembler
MB = Microsoft BASIC
MC = Microsoft C
MF = Microsoft Fortran
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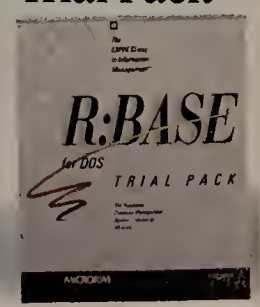

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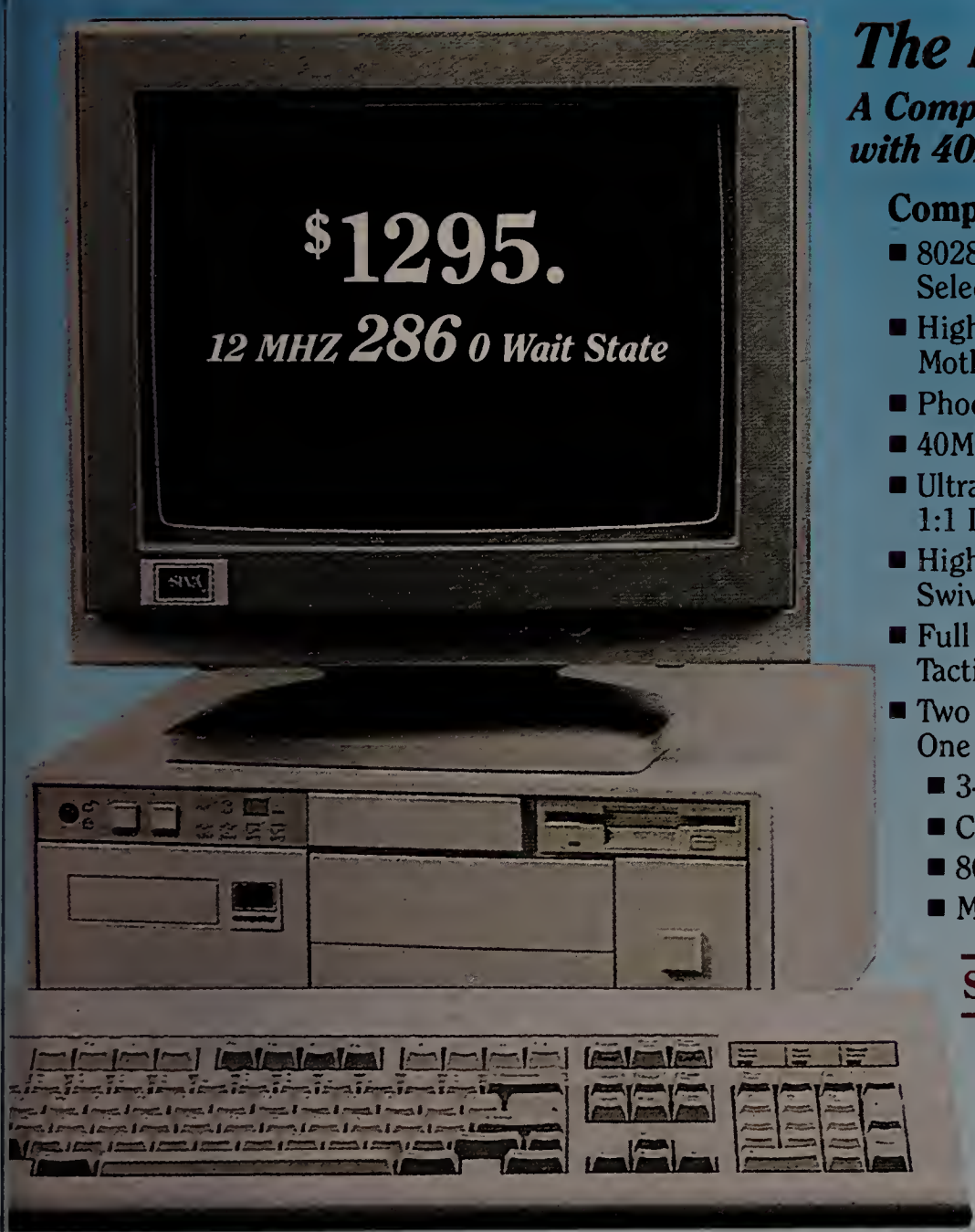

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HOW TO

A Relational Data Base Primer

Is your flat-file data base bogged down with redundant information? It may be time to explore a relational approach.

Richard Scoville

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Anyone who juggles facts in a business setting has to track many related items of information: employees and the departments where they work, machines and their servicing, and orders and the products involved. Useful though they are, flat-file data bases can't manage such relationships efficiently because they must store all related data in a single file. What's needed is a relational data base—one in which data is stored in separate files (or tables) linked by common fields (or columns). These links allow multifile operations, such as updating several files with a single data entry form or generating a report using data from related forms.

Reunion at Dragnet U.

In an earlier "Tips & Techniques" article ("How to Design a Data Base File," *PCW*, March 1989), we used the case of Dragnet University to illustrate how a flat-file system works. Your assignment then was to automate the Dragnet Alumni Association contribution records. The result was a simple but elegant data base with one record for each alumni donation.

Unfortunately, a problem has developed. Loyal Dragnet alumni tend to make several donations per year; many send a check every month. For each check, you must reenter the donor's name, address, and so on, wasting time and disk space. Moreover, data integrity is at risk every time a variant shows up, as when a per-

son writes his or her name in several different ways.

To make matters worse, the dean has recently instituted the Dragnet Funds program. From now on, each contribution must be earmarked for the Stadium Fund, the Academic Fund, or the General Alumni Fund. The dean now wants you to modify the system to produce two new reports: a daily journal that lists contribution amounts, donors, and funds; and a quarterly directory that subtotals donations by fund and then totals all the funds.

You could change the existing donations file to accommodate these reports—add fields to store the fund name, its chairperson, and so on. But that would produce even more duplication. Or you could set up one record for each alumnus, with fields for DONATION1, DONATION2, and so on. That would make mailings easy, but over time, some alumni make dozens of donations. Besides, how would you keep track of the fund data for the reports?

Separating the Files

The problem is that the data base system is being asked to keep track of three categories of information—alumni, contributions, and funds—that have *one-to-many* relationships. One alumnus can make many donations; one fund receives donations from many alumni. That calls for a relational solution with three files instead of one: Alumni, Donations, and Funds.

The Alumni file should contain one record per alumnus. Fields include a unique STUDENTID, name, phone number, address, year of graduation, and so on. The Donations file records facts about each donation: DATE, AMOUNT, and the STUDENTID of the contributor. STUDENTID is the *key field* relating alumni and their donations: Since STUDENTIDs are unique, there is no question about who made which donation. Although multiple contributions mean multiple donation records, they still contain the same STUDENTID. Finally, the Funds file stores the name of each fund (FUNDNAME), the fund committee chairperson, and a unique FUNDID. To relate each donation to its fund, the Donations file also includes the key field FUNDID. (See **FIGURE 1**.)

Separating the funds, the alumni, and their contributions makes for efficient storage: Each fact is recorded in just one field in one record in one file. For instance, there's no need to duplicate an alumnus's address along with each donation; you enter that information once into the Alumni file, then look it up when needed. That way, when an alumnus moves, you need to update only one record.

The efficiency of this design emerges when the dean asks a question like, Which funds has Oprah Singer contributed to?

FIGURE 2 illustrates what the data base actually does in answering the query. First, it finds Ms. Singer's STUDENTID (727545) in the Alumni file; it then proceeds to the Donations file to find her donations. For each one, it notes the FUNDID (ALUM). It then goes to the Funds file, which reveals that Ms. Singer has made two donations, both to the General Alumni Fund.

From Flat to Relational

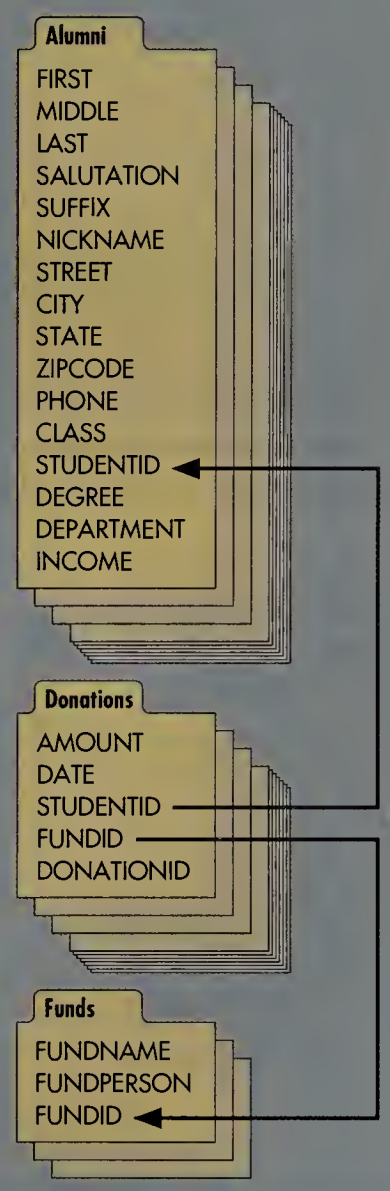

FIGURE 1: The Alumni file consists of all the fields from the Students file (our original flat-file example) except for DONATION, which contained the amount donated. That field was renamed AMOUNT and is now part of the Donations file. Each Donations record contains a STUDENTID field, which links that record to the donating alumnus's record in the Alumni file, and a FUNDID field, which links it to one of the three records in the newly created Funds file.

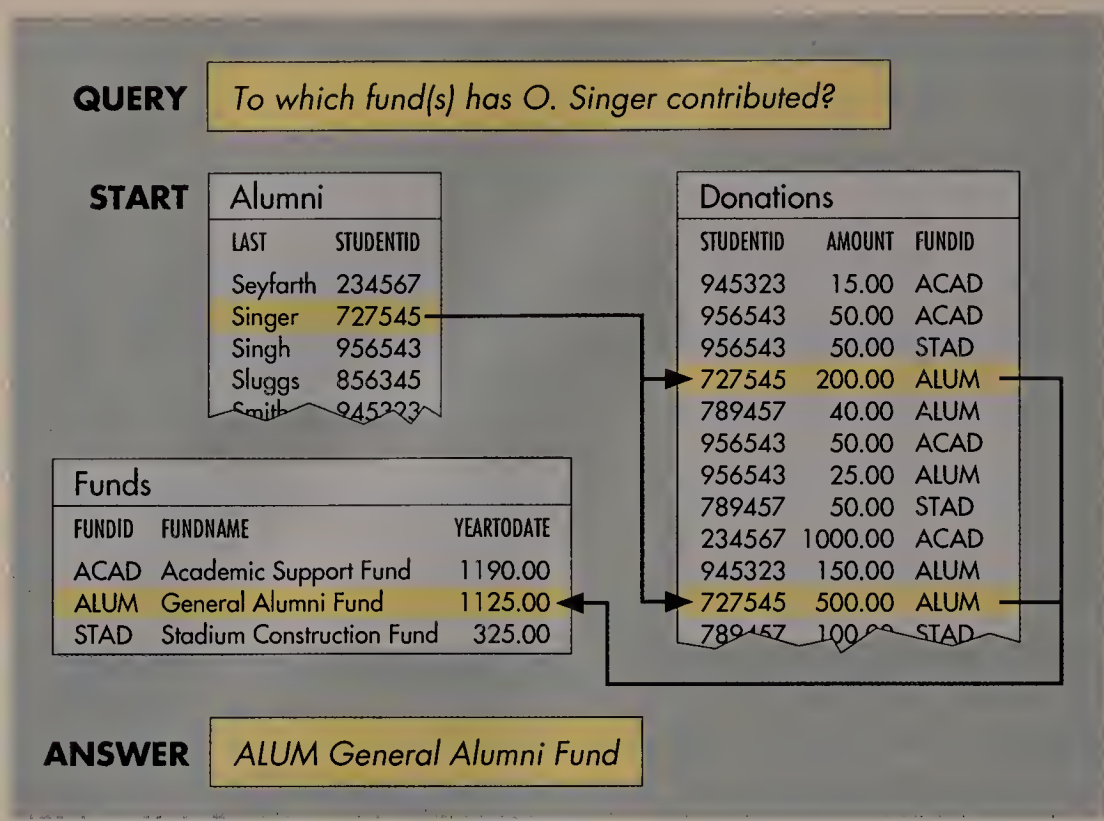

FIGURE 2: A relational data base makes it easy to enter, update, and find related data. This figure shows how a query finds linked information in three separate data tables.

Daily and Quarterly Reports

The daily journal lists donations by DATE. For each donation, the report must look up the donor's name in the Alumni file, based on STUDENTID. Similarly, it can locate the FUNDNAME in Funds based on FUNDID.

The quarterly donations directory reports donations by fund. Starting in the Funds file, it secures the FUNDID of the first fund; then, in the Donations file, it lists the donations with that FUNDID. For each donation, STUDENTID provides access to the donor's name and address.

Note the *many-to-many* relationship between Funds and Alumni: Each alumnus may contribute to many funds, and each fund receives contributions from many alumni. The many-to-many relationship is mediated by the many-to-one relationships between Alumni and Donations and between Funds and Donations. A donation represents a transaction between an alumnus and a fund, so we say that the Donations file is a transaction file relating Alumni and Funds.

Managing Your Relations

The role of a relational data base manager is to automate data relationships. Typically, that involves opening two or more files at once, indexing one file on the key field (to speed the lookup process), and linking files so that a query in one automatically accesses related records in the other. In addition, most relational programs allow you to easily create *views* consisting of fields from two or more related files. The ideal is a system of transparent relationships that behave like one big data base: Users simply ask for data by field, without worrying which file holds the records or how the relationships are managed.

Once you understand the relational concept better you'll see the need for relational designs everywhere. Remember the two tip-offs that indicate a relational design is needed: You find yourself reentering the same data in many records; and you're tempted to add a set of fields—one field for each instance (DONATION1, DONATION2, and so on, for example)—for data related to a given record. When either occurs, it's time to move up to a relational data base. ●

Richard Scoville is director of curriculum for The Office Works Training Center and a contributing editor for PC World.

TIPS & TECHNIQUES

Operating Environments

Fine-Tuning Desqview

Four multitasking tips to help you juggle applications with aplomb

What you need: Desqview/386 version 2.22

Unlike *Microsoft Windows* and OS/2, *Desqview* is designed to weave together DOS programs that were never intended for a windowed environment. However, making applications work harmoniously in *Desqview* is a questionable proposition. The setup process is complex, and transferring data between

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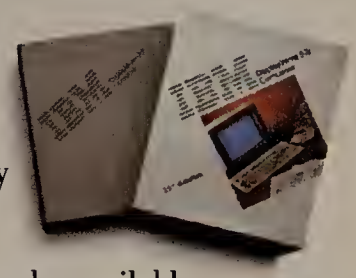

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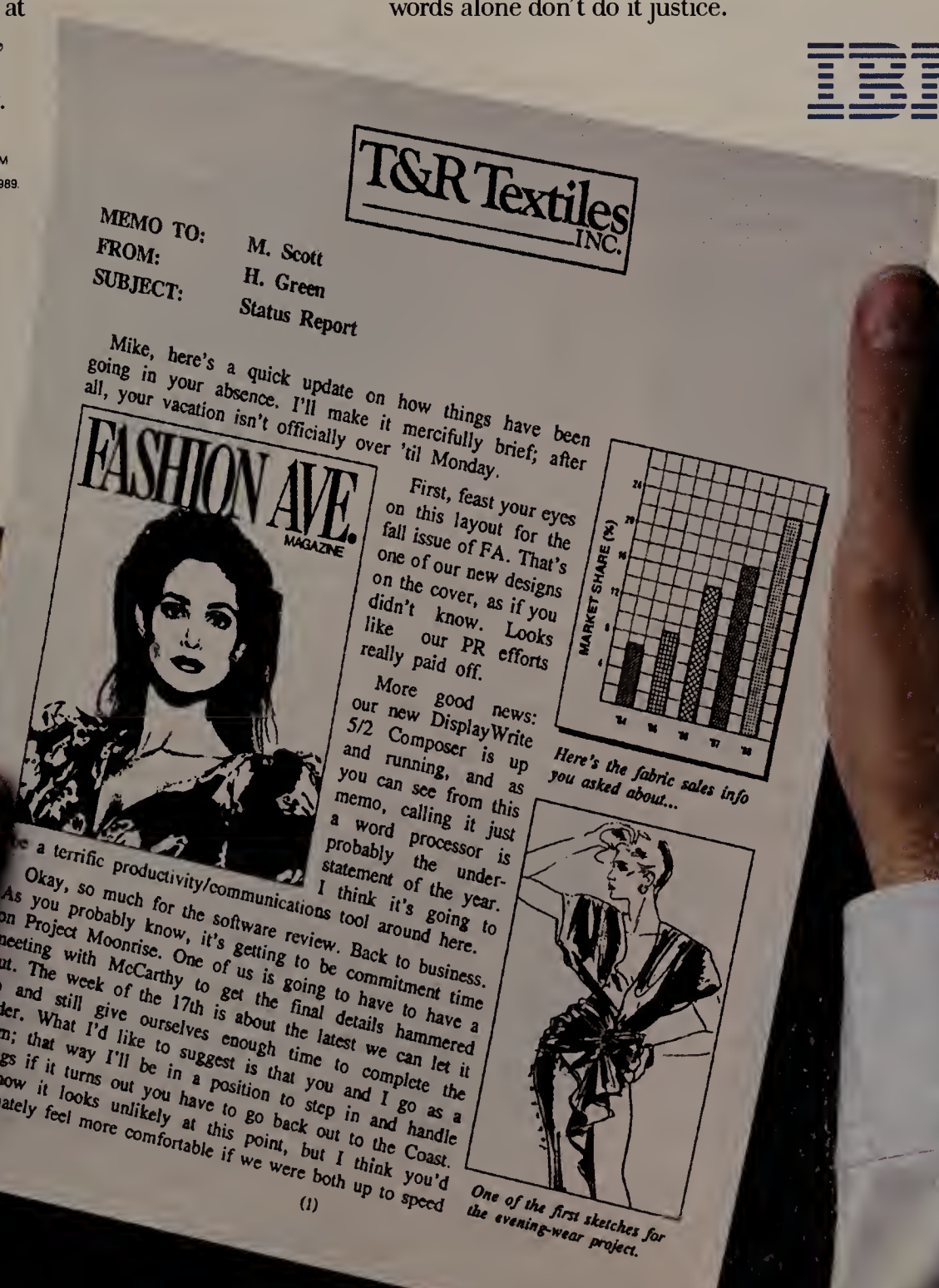


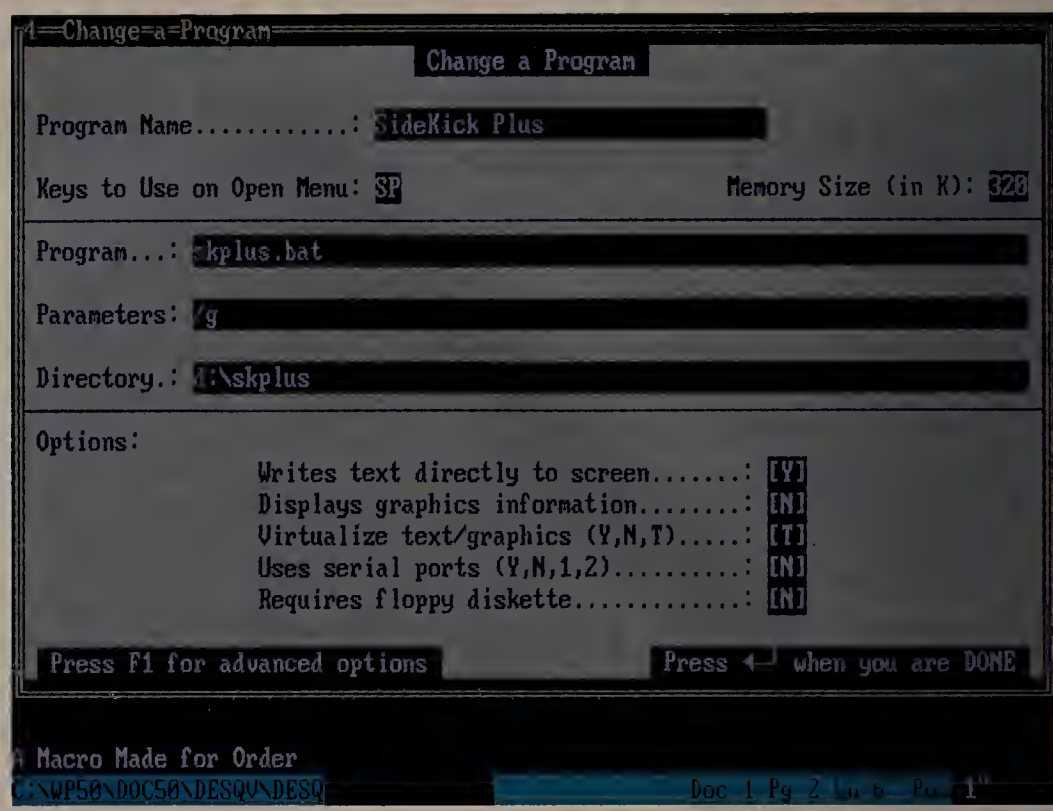
applications takes some getting used to. Moreover, you must confront the infamous DOS 640K RAM limit. This article provides four handy tips to help you make *Desqview* an efficient program manager. In the tips that follow, <Desq> refers to *Desqview*'s user-definable hot key; <Alt> is the default.

Managing 286 Memory

Although *Desqview/386* can run applications in Enhanced EMS and EMS 4.0, each window's memory size is basically limited to the amount of conventional RAM left after loading *Desqview* itself. Depending on your hardware, you may be able to load part of *Desqview* into extended memory and free up some RAM. The *Quarterdeck Expanded Memory Manager-386*, a utility included with *Desqview/386*, makes this task seamless and simple for 386-based machines with at least 1.5MB. However, if you use a 286 with an expanded memory card, things get tricky.

Since *Desqview* can load roughly 60K of itself into a 286's extended memory, change 64K of expanded memory to extended memory using your card's DIP switches. Some expanded memory cards require 128K as the minimum reconfigurable unit of memory. Although that may seem like a heavy sacrifice for a 60K gain in conventional RAM, it can mean the difference between a maximum window size of 460K and a maximum of 520K.

To use extended memory, you must first copy the QEXT.SYS device driver from the *Desqview* distribution disk to your PC's boot disk. Now, add the command **DEVICE=QEXT.SYS** to the CONFIG.SYS file so it precedes any other device driver that uses extended memory.



To set up TSRs that work with a particular application, use the Change a Program menu to set up a batch file that automatically loads both programs in one window.

Desqview has a utility, XDV.COM, that loads the main program, DV.EXE, putting 60K into extended memory. In order to start *Desqview* with the familiar DV command, you can rename the XDV.COM utility DV.COM, since DOS will load a .COM file before an .EXE with the same file name.

Using TSRs With Desqview

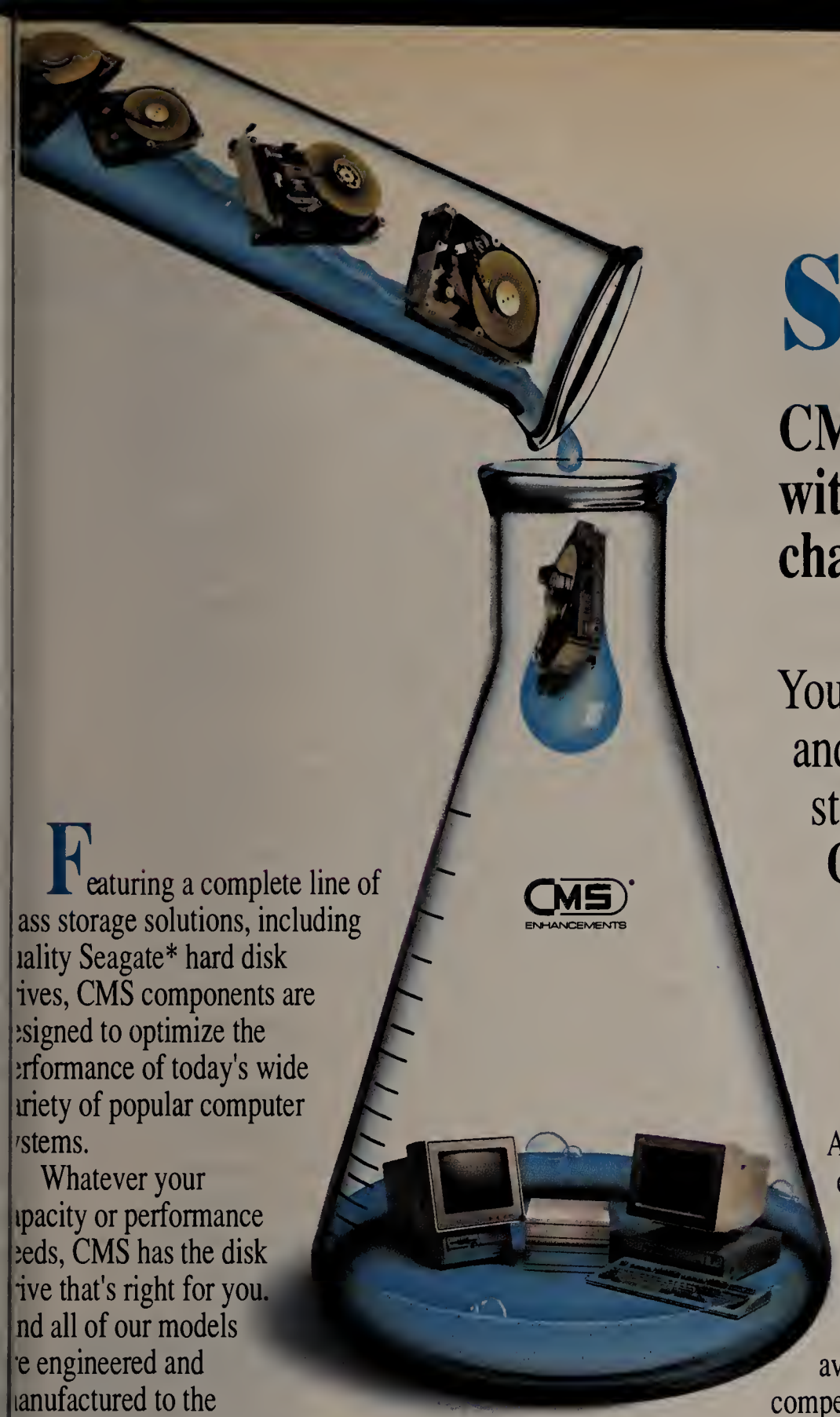
Terminate-and-stay-resident programs (TSRs) are notorious memory guzzlers that should never be loaded before *Desqview*. Check your AUTOEXEC.BAT file and make sure TSRs are positioned to load after *Desqview*.

If you use TSRs, create separate windows for pop-up utilities such as *SideKick Plus*. Load TSRs such as keyboard enhancers into the same window as the application they work with by creating a batch file that loads first the TSR and then the application. To close the window automatically when you exit the application, simply enter 'Exit' as the last line of the batch file.

Now use *Desqview*'s Change a Program feature to change the application's name, including the extension, to that of the batch file. Press **<Desq> OCP**, select the program you want the TSR to work with, and press **<Enter>**. Next, press **<Tab>** twice and enter the new memory size. As a rule of thumb, increase the allotted memory by the amount the TSR requires plus 4K, since windows that open with batch files must load COMMAND.COM (about 3.5K). Press **<Tab>** to enter the batch file name into the Program box. To make sure the window doesn't close after you load the TSR, press **<F1>** to display the Advanced Options menu, select *close on exit*, and press **N <Enter>**.

A Macro Made to Order

The quickest way to switch *Desqview* windows is to press the <Desq> key and then the appropriate window number.



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Circle 36 on reader service card

However, you must know the order in which the applications are loaded. Here's a start-up macro that helps you remember window numbers by loading programs in the same order every time.

Start in *Desqview* with no windows open. Hold down **<Shift>** and tap **<Desq>** to display the macro menu. Then press = to start the macro recorder and ! at the key assignment prompt. Next, type a script name, press **<Enter>** to begin recording the macro, and start your applications in the desired order. When you finish, hold down **<Shift>**, tap **<Desq>**, and press – to end macro recording. Finally, hold down **<Shift>**, tap **<Desq>**, and then press **S** to save the macro.

Auto-Zoom Macro

Sometimes it's convenient to have an application start with a full-screen window. The *Desqview* documentation instructs you to use the Window Position option from the Change a Program Advanced Options menu to make windows open automatically with a full screen. This effectively disables the zoom command (<Desq>Z) since it makes Desqview "zoom" from a full screen to a full screen.

A more practical technique is to create an application start-up macro that automatically zooms the window to a full screen. From within the application, start a macro as described previously. At the key reassignment prompt, select any key you won't need within the application. Name the macro "!startup," and for the macro contents press **<Desq>Z**. Now your application will zoom to a full screen every time you start it, and the zoom command will still function normally. —*Lincoln Spector*

Desktop Publishing

Ventura Fonts Without Tears

Adding fonts to Ventura with Fontware 2.0 is easier than you think.

What you need: Fontware 2.0, Ventura Publisher 1.1 or 2.0

Until recently, the LaserJet was limited to its ho-hum internal typewriter fonts, Hewlett-Packard's expensive font cartridges (offering mostly Times Roman and Helvetica), and hard-to-use soft fonts. Then along came Bitstream's *Fontware*, an innovative font generation program that produces almost any size font from a set of master outlines. Because *Fontware* generates only the exact sizes you request, you'll never eat up hard disk space with megabytes of unused bit-mapped fonts. *Fontware* even creates matching screen fonts for precise typesetting.

Creating fonts with *Fontware* isn't particularly difficult, but the process can throw you the first time. This step-by-step article explains how to install *Fontware* and create and install a single font for *Ventura Publisher*. You can later follow the same steps to create multiple fonts in one session. If you use versions of *Fontware* bundled with other programs, you'll find the process very similar.

Installing Fontware

Naturally, *Fontware* must be configured for the character set you plan to use and told where to store its fonts. So before you begin, note what directory *Ventura* occupies and the video setup and printer you'll use.

1. Put the Fontware Installation Kit Disk 1 in drive A:, type **A:Fontware**, and press **<Enter>**.
2. At *Fontware*'s main menu, press **<Enter>** to select Set Up Fontware.
3. Press **<Enter>** to store *Fontware* in the C:\FONTWARE directory, or type a different name and press **<Enter>**.
4. Specify the directory where *Ventura*'s program files are stored, using the same method.
5. Select the video setup by highlighting the appropriate entry on screen, and press **<Enter>**.
6. Select the character set—the letters and symbols that make up a font—for the screen fonts *Fontware* will generate. If you want to save disk space and don't need foreign language characters or symbols, choose VP US; if you need foreign characters, choose VP International.
7. Pick your printer from the next list *Fontware* presents. When you're asked to select a character set for the printer, pick the same set specified in step 6. Press **<F10>** to confirm your choices.

Make a Font

With *Fontware* in place, you can now copy the master outlines to your hard disk and start making bit-mapped fonts. In this example, you'll install the Dutch Roman master outline from the *Fontware* library disk and use it to create an 11-point font. *Fontware* automatically crafts both portrait and landscape versions of the font.

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Generally, try not to generate lots of screen fonts, especially in large point sizes, because they take RAM that *Ventura* could use. *Ventura* will automatically use one of its own Dutch or Swiss screen fonts when you work—an acceptable compromise for most typesetting jobs. However, screen fonts are a must if you're setting ornate display type or using symbols not found in the VP International character set.

1. From *Fontware*'s main menu select Add/Delete Fontware Typefaces, and press **<F3>** to add a new typeface.

2. Place the disk labeled "Dutch, Dutch Italic, Dutch Bold, Dutch Bold Italic" in drive A:, and press **<Enter>**. Then pick Dutch Roman and press **<Enter>**.

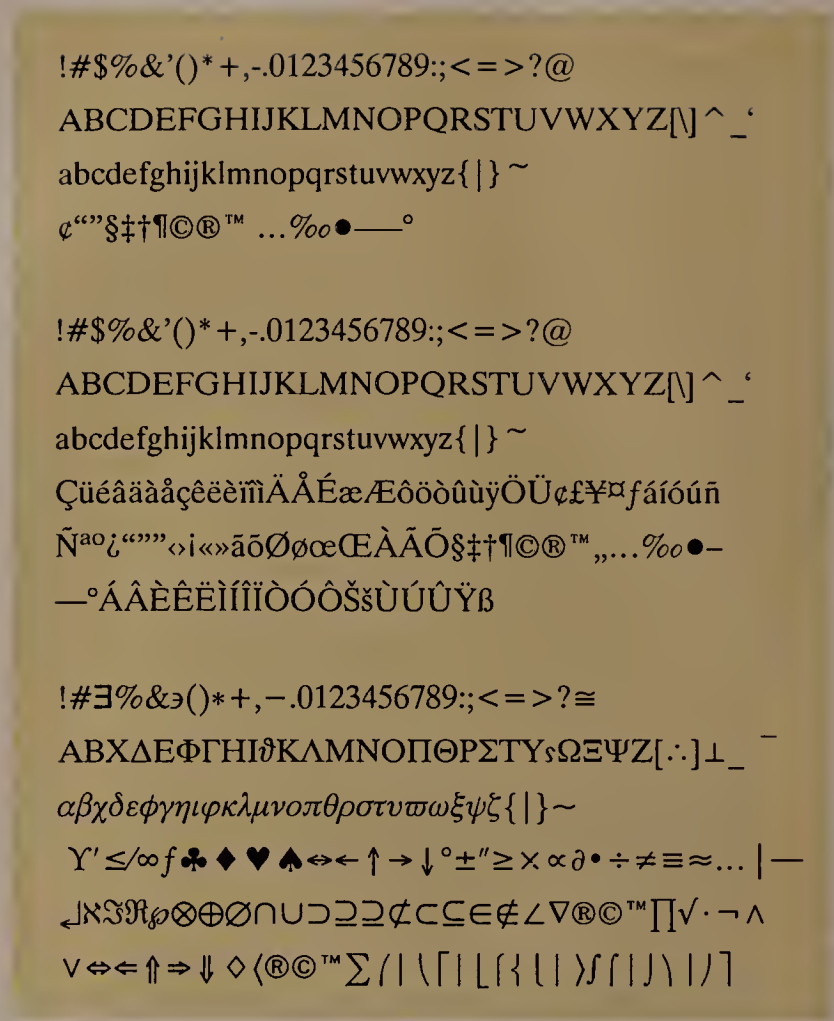
3. Press **<F10>** to copy the Dutch Roman master outline to your hard disk, then press **<F10>** again to display the Make Fonts menu.

4. Highlight Dutch Roman on the left side of the screen, and press **<Enter>**. The cursor jumps to the right, where font size is specified. Type **11** and press **<Enter>**. To create multiple fonts, you would simply type all desired point sizes on this line, separated by spaces.

5. If you want an accompanying screen font, press **<F2>** to enter the screen font menu, and follow the instructions in step 4. You can create screen fonts for any or all of the printer fonts.

6. To generate the printer and screen fonts, press **<F10>**, then **Y**, and go get a cup of coffee.

7. After *Fontware* generates a font, it creates a width table that *Ventura* uses to space and kern the font's characters. When *Fontware* displays the width table name (for the sake of this article, assume the name is HP_LJ000.WID), jot it down—you'll need it soon.



Ventura offers three character sets—VP US, VP International, and Symbol. The symbol set is available to a font only when specified.

Install the Fonts for Ventura

You can't use the new printer fonts and screen fonts until the new width table is merged with HPLJPLUS.WID, *Ventura*'s standard LaserJet width table. The steps:

1. At the DOS prompt, type **DIR/P C:\VENTURA*.SF?** to list all the LaserJet fonts in *Ventura*'s directory. Make sure the newly created *Fontware* fonts, AI110IHP.SFP and AI110IHP.SFL, are present.

2. Copy the new width table into the Ventura directory by typing **COPY C:\FONTWARE\HP_LJ000.WID C:\VENTURA**.

3. Type **VP** or **VPPROF** to load *Ventura*.

4. From the Options menu, select Set Printer Info.

5. Make sure the Width Table entry reads HPLJPLUS.WID. If a different table is listed, click Load Different Width Table, select HPLJPLUS.WID from the list, and click on OK.

6. From the Options menu, select Add/Remove Fonts, then Merge Width Tables.

7. From the list of width tables, choose HP_LJ000.WID, and click on OK.

The tables are now merged, and the 11-point Dutch font is available. To confirm installation, set a paragraph of text with the new font. Switch to paragraph tagging mode, tag a paragraph with the Body Text tag, and pick Select Font from the Paragraph menu. The font list should include the 11-point Dutch Roman font. Select it, and watch the text transform. Then give yourself a pat on the back—the entire universe of Bitstream's fonts is open to you. Just be prepared for some long coffee breaks.

—*Ted Nace*

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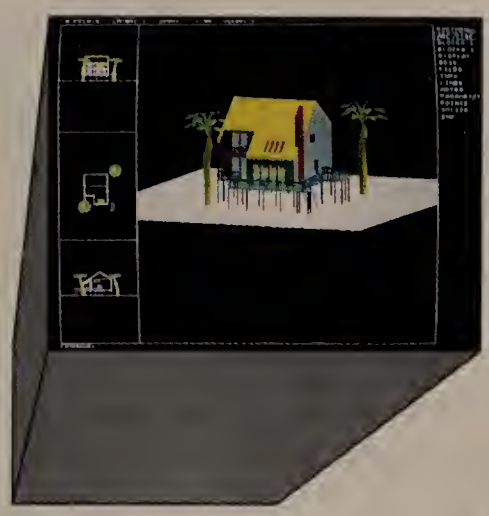

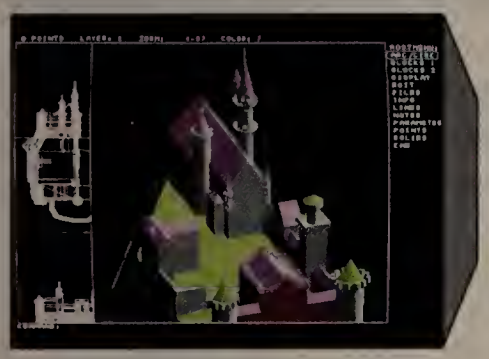

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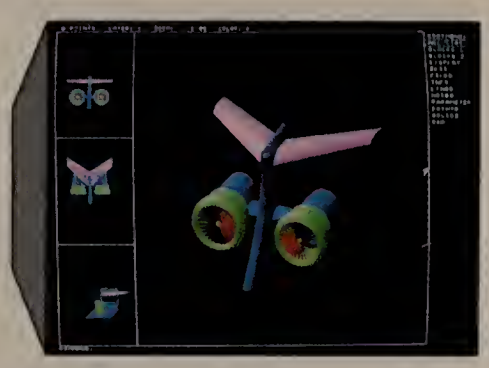

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Desktop Publishing

Scanning Gray-Scale Images

Scan photos and drop them in your documents without wasting time and disk space.

What you need: a gray-scale scanner, scanning software

If you're like most desktop publishers, adding photographs to a publication is a job you leave to the printshop. Yet with a gray-scale scanner, you can convert photographs into high-quality electronic images, place them in a document yourself, and print complete pages on a laser printer or typesetter. In return for the extra effort, you gain greater control over your work and save money in the long run.

In a previous "Tips & Techniques" article we discussed the ground rules for scanning line art (see "Scanner ABCs," *PCW*, June 1989). This article focuses on scanning images that contain continuous tones, such as photographs and paintings. The illustrations in this article were produced using a Hewlett-Packard ScanJet Plus and HP's *Scanning Gallery Plus*. However, most of the tips also apply to other gray-scale scanners and scanner software.

Choose the Right Scan Mode

Gray-scale scanners don't automatically produce gray-scale image files. When you scan an image using the halftone (dithered) mode offered by nearly all scanner software, the result is a black-and-white pattern of dots that can't approach the quality of true gray-scale output. Unless your desktop publishing program lacks support for gray-scale files, use the gray-scale mode when scanning continuous-tone art.

The goal of gray-scale scanning is to create an accurate electronic reproduction of continuous tones, using between 16 and 256 discrete shades of gray. The number of gray shades depends on the amount of information a scanner gathers for each of the tiny points that make up the scanned image; the more bits per point, the larger the number of grays. In line art mode, a scanner generates only one bit per point, while in gray-scale mode it produces multiple bits per point.

Some gray-scale scanners offer more than one multiple-bit scan mode. For instance, the ScanJet Plus provides a choice between 8-bit scans (for 256 grays) and 4-bit scans (for 16 grays), while other scanners offer 6-bit scans (for 64 grays). Choosing the multiple-bit scan mode that captures the most gray-scale information usually yields the best results, especially if you print the image on a high-resolution imagesetter, such as a Linotronic, which produces excellent halftones containing 90 gray levels or more.

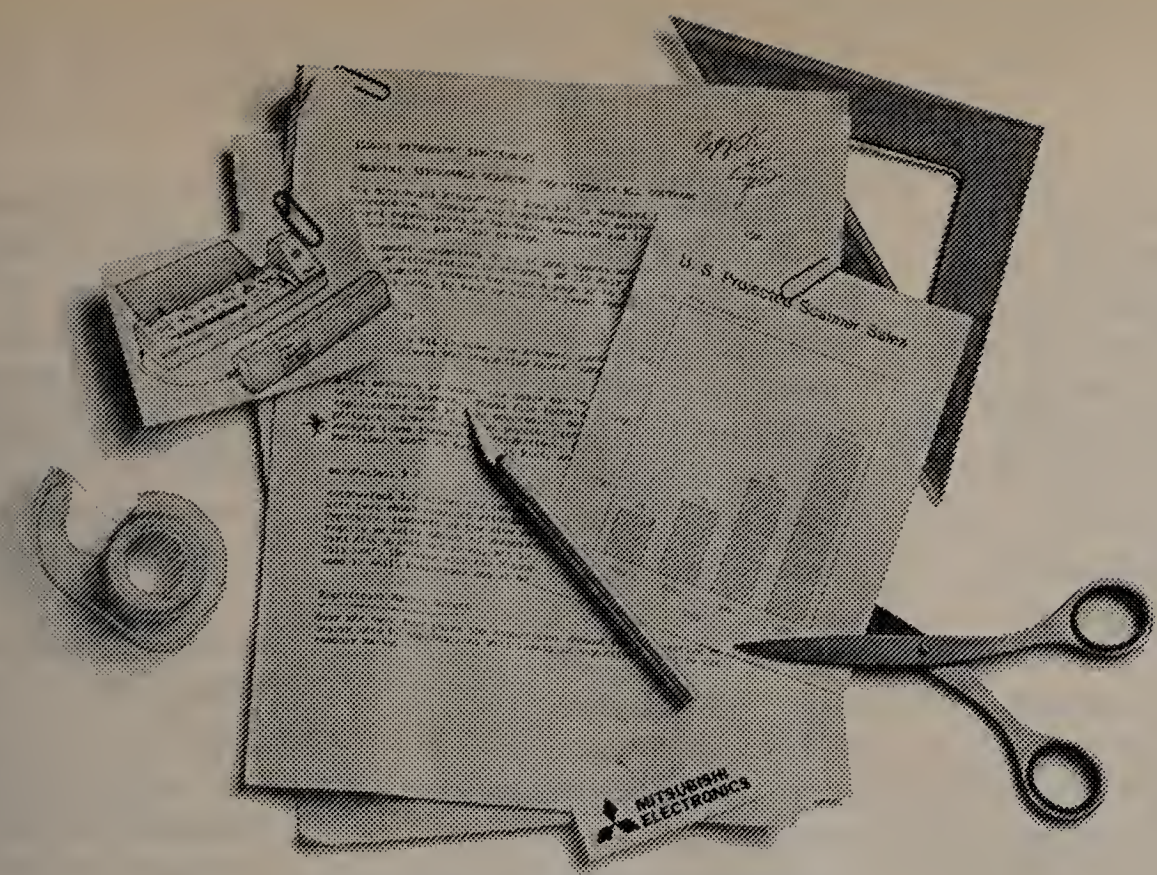
Eliminate Excessive Grays

An 8-bit scan soaks up more disk space and requires more time to process and print than a 6- or 4-bit scan, by factors of 50 and

Even though the top image was scanned at 80 dpi and the bottom one was scanned at 300 dpi, these two 300-dpi print samples are practically indistinguishable.

100 percent, respectively. If top-quality images aren't crucial, choosing a scan mode that captures fewer grays may be worth the savings in disk space and time. And if the original art—say, a high-contrast photograph—has only a few shades of gray anyway, a 4-bit image may fill the bill.

If you use a 300-dot-per-inch laser printer, an 8-bit image often contains more gray-scale information than the printer can render effectively. With 300-dpi hard copy, the best-looking halftones seldom have more than 37 gray levels—well within the range of a 6-bit scanner. True, an 8-bit image provides a larger number of grays from which the 37 grays are selected, but the



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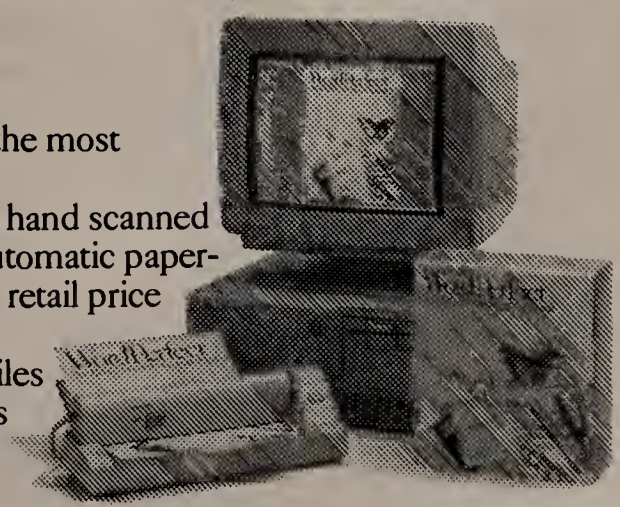

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difference between an 8- and 6-bit 300-dpi halftone rarely justifies the extra baggage. In most cases, even if you're using an image-enhancement board that produces fine halftones with 64 grays on a LaserJet, such as Intel's Visual Edge, 8- and 6-bit scans of the same image won't be easily distinguishable.

Avoid Resolution Overload

One of the biggest advantages of gray-scale scanning is that you can save additional disk space and processing time by using a scanning resolution rate well under 300 dpi (the maximum for most desktop scanners) and still obtain excellent halftones. Note, however, that this applies only to images that have not been *enlarged* after scanning.

If you use *Ventura Publisher* or *PageMaker* to print a gray-scale image on a 300-dpi PostScript laser printer, the default program settings produce a halftone screen of about 53 lines per inch (lpi). As long as the gray-scale image was scanned at a dpi resolution at least 1½ times the lpi resolution—in this case, approximately 80 dpi—the final printed image will usually look about as good as it would scanned at a full 300 dpi.

On a high-resolution imagesetter, you can produce excellent halftone screens (between 90 and 150 lpi) using the same formula for acceptable scanning resolution. For example, if you print a gray-scale image at 1270 dpi using a 90-lpi screen, a 135-dpi scan will do just fine; for a 2540-dpi image using a 150-lpi screen, scan the image at 225 dpi. Of course, your scanner's resolution options may not match the specific ones mentioned here; in such cases, use the next highest resolution setting.

Use Gray-Scale TIFF Files

Most gray-scale scanners allow you to save images in several file formats. However, only the Tagged Image File Format (TIFF) and Encapsulated PostScript (EPS) format are capable of retaining the gray-scale information required by publishing programs like *PageMaker* and *Ventura Publisher.* If you have a choice, save the scanned images as TIFF rather than EPS files; the latter usually gobble more disk space.

Save Time With Draft Scans

A final tip: Do a low-resolution draft scan with minimal grays before you perform a final top-quality scan. By using the draft scan with your publishing program during page layout and proofing, you'll waste less time loading the image, displaying it on screen, and sending it to the printer. —*Richard Jantz*

USER GROUP TIPS

Helpful hints from members of the nation's user groups

Safe Saves With 1-2-3 Macros

If you use a macro to save *1-2-3* worksheets automatically, one day you may try to save a file you haven't yet named. Once you start the macro, it will write over the contents of the first file listed in the current directory. To safeguard against losing your data, make the first file a dummy file. Since DOS sorts the exclamation point before any other characters, call the blank file "!.wk1," or "!blank.wk1." Make sure that the blank file appears in all *1-2-3* directories and subdirectories.

Claude Delphia
Modesto PCUG

Cutting Paradox Files Down to Size

In Edit mode, *Paradox* saves deleted records. To reclaim some disk space, use the Modify and Restructure commands. First back up the data table and related files. Next, select Modify from the main menu, then select Restructure, and press <F2>. This command rebuilds the table record by record without altering its structure, eliminating deleted records in the process. How much disk space this technique reclaims depends on the number of deleted records.

The Restructure command is most efficient when less than 80 percent of a file is undeleted data. To check the status of a file, use this formula: (number of records) × (bytes per record)/(size of the file in bytes). If the result is .80 or less, it's a good idea to restructure the file.

Jim Kocis
NYPC Users Group

How Fast Is That dBASE Routine?

Whenever you add a subroutine such as Les Siemens' dBASE Time.Check [*User Group Tips, PCW,* February 1989] to a *dBASE* program, you increase the time it takes to run the program. When you're dealing with a data base containing several thousand records, that extra time mounts up. One way of checking the additional drag

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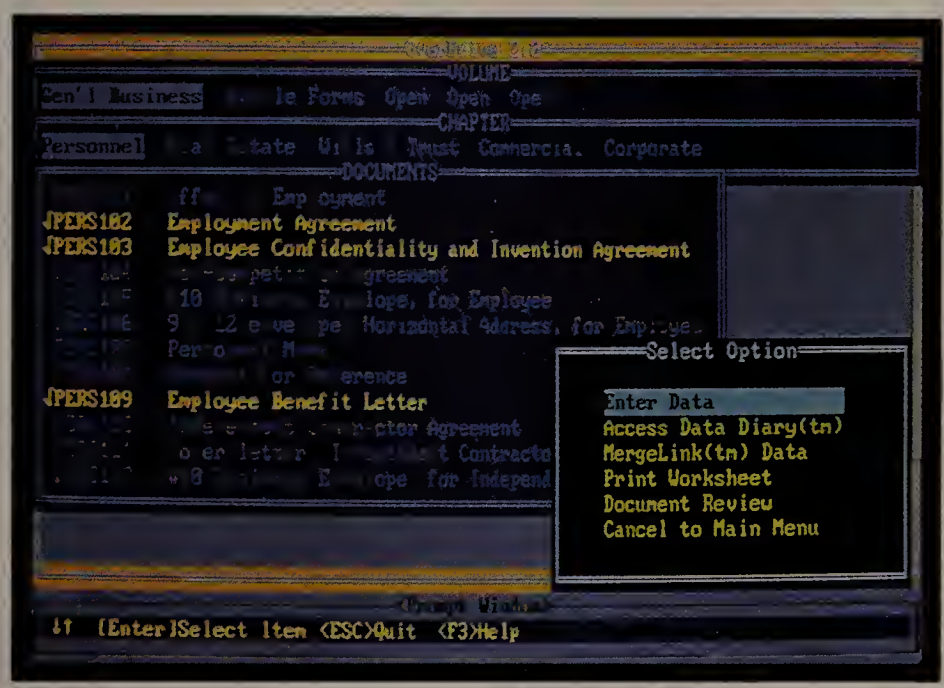

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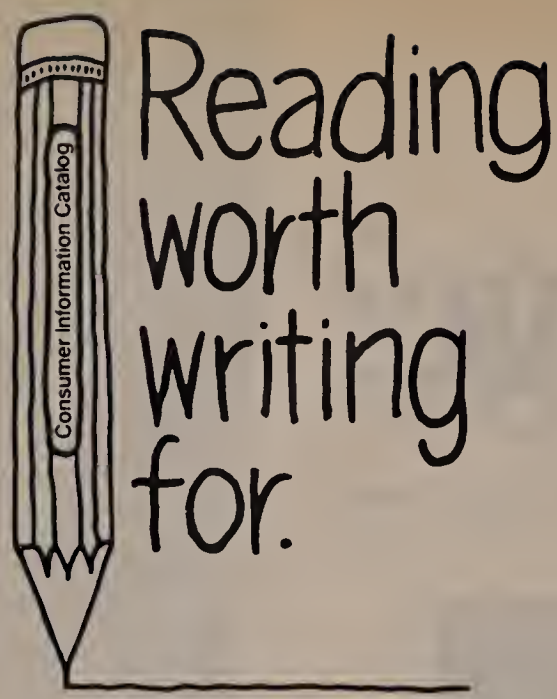

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caused by subroutines is to run a timing benchmark.

Here's a program, called Timetest.prg, that gauges subroutine run time. The second line of code sets the total number of records in the data base, in this example 10,000.

```
* timetest.prg
set talk off
total_rec = 10000
record = 1
* convert time at beginning to seconds
t
= time()
t1 = val(subs(t,7)) + 60*val(subs(t,4,2))
+ 3600*val(subs(t,1,2))
* this is the code we are timing
                ⋮
[enter your subroutine here]
                ⋮
*convert time when done to seconds &
display difference
t = time()
t2 = val(subs(t,7)) + 60*val(subs(t,4,2))
+ 3600*val(subs(t,1,2))
? t2 - t1
return
```

Barry Pollack
North West IBM PC Users Group

Correction

In "dBASE Time Check" (*User Group Tips, PCW,* February 1989), two lines in the dBASE code in Screen 1 are incorrect. Line 4 should read **DO WHILE .NOT. EOF()**, and line 5 should read **@ 23,00 to 23,79**. *PC World* regrets the errors.

Chip in! If you're a member of a user group and have tips to share, send them to PC World. *We pay $25 for each published tip. Or if you have a business problem that requires a PC solution, get in touch with our experts. See How to Contact PC World, page 4.* ●

Lincoln Spector edits technical publications for 800-Software in Berkeley, California; does private consulting; and writes a humor column for Computer Currents *magazine. Ted Nace is a contributing editor for* PC World. *His article is adapted from his and Daniel Will-Harris's book* Ventura Tips and Tricks, *second edition (Peachpit Press, Berkeley, California, 1989). Contributing Editor Richard Jantz is the author of* Ventura Publisher 2.0: Mastering Desktop Publishing *(John Wiley & Sons, New York, 1989).*

POWER TIP NO. 61

Changing Default File Sorts in Professional Write

Professional Write 2.0 sorts files in a subdirectory alphabetically by file name and then file name extension. To change the default sort criteria, press <Ctrl>-G to list a subdirectory, press <F8> to display the Sort Order window, and use <Tab> to highlight a sort criterion—file name, extension, date, or file size. Type 1 to make it the primary sort factor, 2 to make it the secondary factor, and so on. You can repeat the process for all four fields.

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CONSUMER WATCH

Advice and information for the computer consumer

Want to know about the tricks memory can play? Read this to find out how much RAM you actually get when you buy a PC.

Anita Amirrezvani

Memory Lost and Found

Consumer Watch reader Jaime Logreira, who lives in Colombia, got an unpleasant surprise last time he purchased a computer. After reading ads and an item in *PC World*, he bought a Dell System 310, a 386 machine that comes with 1MB of RAM. But when Mr. Logreira turned on the computer and looked at the setup screen, he was dumbfounded by the following message: '640 KB of RAM 0000 KB Extended.' What happened to the rest of the RAM? wondered Mr. Logreira.

It's a good question—and one that requires some background explanation to answer.

On a typical 286 or 386 system with 1MB of RAM, you can expect to get 640K of memory, often called "conventional" or "user" memory because you can apply it to your applications, memory-resident programs, and related files.

Beyond that, many 1MB systems also provide 384K of extended memory. This extended memory, as such, has limited uses with DOS. However, you can take advantage of it with a little effort—for example, by creating a RAM disk to speed up program operations.

Extended memory really comes in handy when it's used as expanded memory (see *The Help Screen*, *PCW*, April 1989). 80386 processors—but not 80286s—have a built-in memory management unit that allows you to use the extended memory as expanded, provided your software supports expanded memory.

Now let's step away from the hypothetical system and consider Mr. Logreira's Dell 386. In the Dell system, as in many others, the 384K of RAM is not available as extended memory. Instead, it's used by the system in a process called *shadowing*, which speeds up ROM BIOS and video ROM functions.

The BIOS is the low-level code that allows the operating system or the applications to interface with the hardware. BIOS code is executed from ROM (read-only memory), which is slow compared with the fast RAM found in today's high-speed PCs. "In the original 4.77-MHz PC, that ROM would respond quickly enough," says Steve Valentor, product development manager for Zenith Data Systems. "But as computer architectures got faster, the ROM was outpaced by the rest of the system."

Shadowing takes care of the problem. The system BIOS code (and in some cases, video adapter code) is copied into faster RAM, thereby speeding up many common operations.

Any 286 or 386 can be shadowed, but don't expect to find shadowing used consistently throughout any manufacturer's entire line of PCs. Hewlett-Packard, for example, shadows only its 286 portable and its 386 machines. Tandon shadows its newer machines, according to Ed Allwein, director of OEM systems; its 386SX, 25-MHz, and 33-MHz systems are shadowed, but not the older 16-MHz and 20-MHz systems. The same is true of many other companies.

Some manufacturers offer the option of turning off shadowing to avoid possible incompatibility problems. "Any time you do a nonstandard thing, it's a good idea also to offer a way not to do it," says Steve Dougherty, product manager for the Everex 386 line, which uses shadowing. "I've

(continues)

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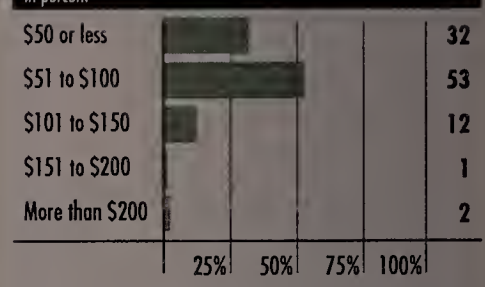

Source: International Data Corporation. From a survey conducted in August 1988 of 188 organizations, each with at least 50 PCs.

never seen any compatibility problems, though."

Shadowing is not optional on some systems. For example, although all Dell 286s and 386s use shadowing techniques, only the 286s provide the option of turning off shadowing, according to Dell technical support representative Tom Harrison.

Once shadowing is off, the freed-up memory can sometimes be used as extended memory. But it all depends on the chip set, according to Nelson Chan, product marketing manager for Chips and Technologies. "Some chip sets implement a hardware technique that remaps the 384K of memory," allowing the user to access it, says Chan.

Tandon machines, for example, free up the entire 384K of

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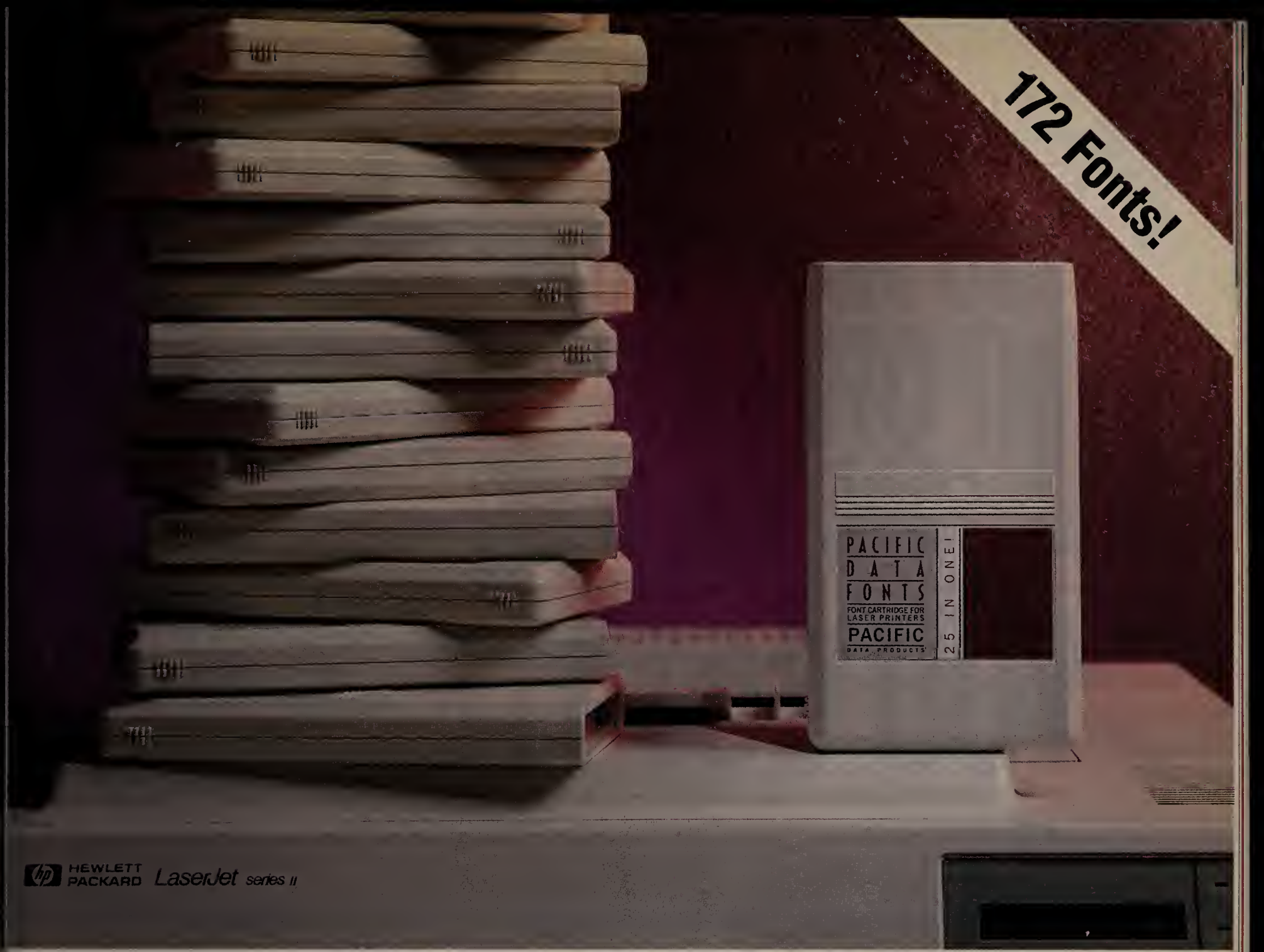

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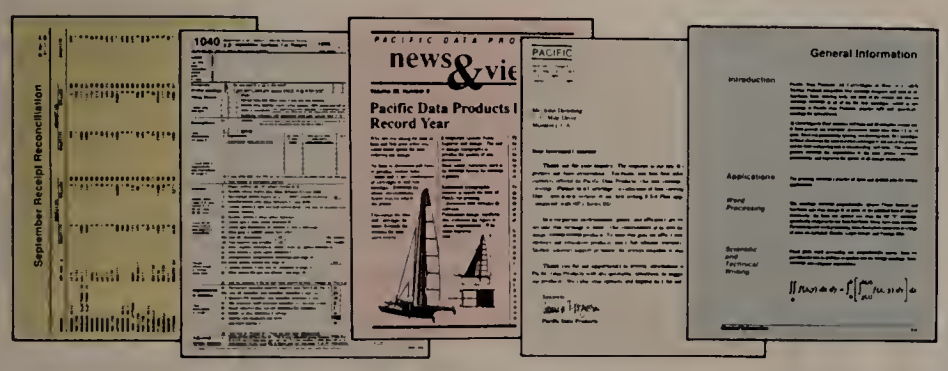

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PC WORLD

RAM when shadowing is off, but not all systems make all the memory available. Mitch Cipriano, Acer's marketing communications director, says 1MB Acer systems use 128K for shadowing, providing a total of 896K of conventional and extended memory. "But even if you turn off the shadowing, you can't access that memory," says Cipriano.

Systems that come with a lot of memory as a standard feature may not use shadowing at all. The Tandy 5000, for example, is a 386 Micro Channel machine that ships with a minimum of 2MB of RAM. "We don't bother with shadowing on that machine," says Tandy senior vice president John Patterson. The company uses other techniques to speed operation.

A Happy Ending for Logreira

Given all these technical twists and turns, it's no wonder Mr. Logreira was confused. When informed of his dilemma, Dell Corporation promised to take steps to avoid future misunderstandings. In a letter to *Consumer Watch*, Customer Service Manager Laura McDonald stated that the Dell machine's setup screen "will be modified to reflect that the additional 384K is resident and system accessible," although not available to the user. Dell also gave Mr. Logreira the option of returning his system for credit.

Even more important for future buyers, McDonald stated that Dell's ads would be changed to say "1MB of RAM (640K usable)." If Dell carries out this

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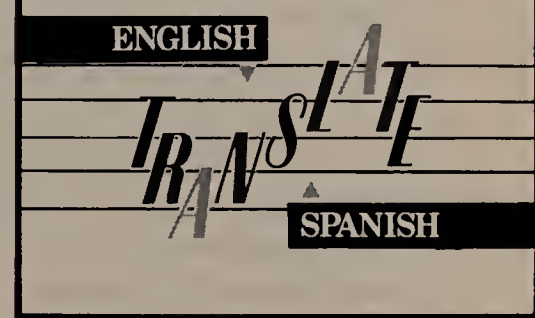

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plan, it will be one of the few manufacturers whose ads clarify the RAM issue. For good consumer relations, all the others should do the same.

SHOP TALK

Micro 1 Files Chapter 11

Micro 1, a computer company in San Francisco, filed for Chapter 11 bankruptcy reorganization on April 25, shortly after the federal district court in Northern California issued a preliminary injunction to prevent the company from doing business.

According to U.S. postal inspector Michael Baum, the injunction was issued after postal inspectors presented evidence of numerous consumer complaints.

Consumer Watch also received dozens of complaints about the company, most of which concerned prepaid orders that were never filled. Despite our repeated efforts to contact Micro 1, the majority of these problems remained unresolved. As a result, in May *PC World* revoked Micro 1's Best Buy award, which was given in November 1988 for the Micro 1 Tower 386-20MHz.

According to Robert Knechtel, the company's lawyer, Micro 1 filed for bankruptcy with approximately $2.5 million in debts and only about $250,000 in assets. Under bankruptcy law, consumers are given priority for repayment up to $900. Beyond $900, consumers share with other unsecured creditors in any assets that remain.

Since the bankruptcy filing, Micro 1 has received infusions of capital and installed a new management team. Rick McCabe, the former president, has remained with Micro 1 as director of marketing. Knechtel says that the company intends to file a plan with the bankruptcy court to repay all creditors 100 cents on the dollar, but at press time he expected the repayment process, even if approved, to take four to six years.

Meanwhile, consumers with a complaint against the company should file a proof-of-claim form (available at legal-supplies stores) with the U.S. Bankruptcy Court (Attention: Claims), 450 Golden Gate Ave., 15th floor, San Francisco, CA 94102; 415/556-2250. The bankruptcy case number is 38901334LK. Be sure to submit your original claim, an

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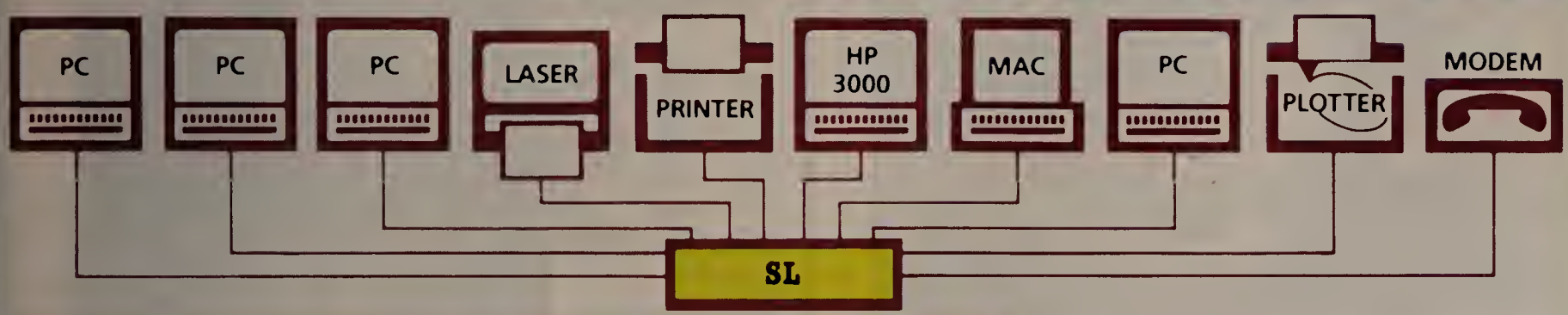

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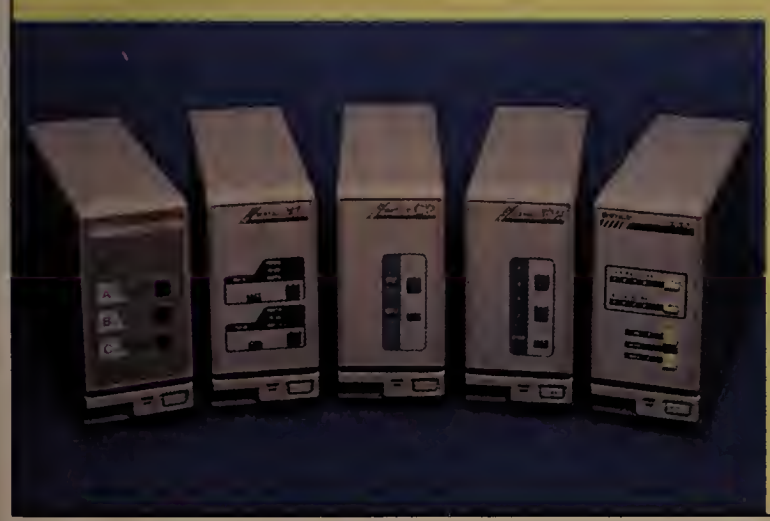

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extra copy, and a self-addressed stamped envelope.

Consumers should also send information to the San Francisco Postal Inspection Service, which is continuing to investigate the old Micro 1. Postal Inspector Michael Baum asks consumers to send the following information: a brief description of what happened; a copy of the ad used in placing the order and copies of any correspondence with the firm, including copies of envelopes; a copy of your canceled check or credit card bill; and your name, address, and phone number. Send this to Richard Schlueter, Postal Inspection Service, P.O. Box 882000, San Francisco, CA 94188.

Consumer Watch is particularly interested in hearing from shoppers who purchase products from the new Micro 1. However, we advise you to pay by credit card so that you are protected and can refuse payment on any unfulfilled orders.

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I've reached the end of my patience. From the moment I purchased an AST Hot Shot/286, I've had problems. About 20 percent of the time my PC freezes as soon as the Hot Shot/286 logo appears on screen. In June 1988 I wrote to AST and described the problem. About a week later I received a call from an employee in technical support who said he believed the problem was a defective cable. He promised to send a new one.

Three weeks later I hadn't heard from him. I called again. Another three weeks passed; I called yet again. Six weeks later, I sent the entire unit back for repair or replacement. The repair department says it can't fix the board because they've run out of cables.

Franklin A. Berryman
Nashville, Tennessee

AST responds: We have been experiencing some problems with the Hot Shot cable. It is somewhat difficult to install, particularly for customers who may be new to hardware. This has resulted in a higher failure rate of cables than originally anticipated, causing shortages of replacement cables. We have increased our stocking level of replacement cables to prevent

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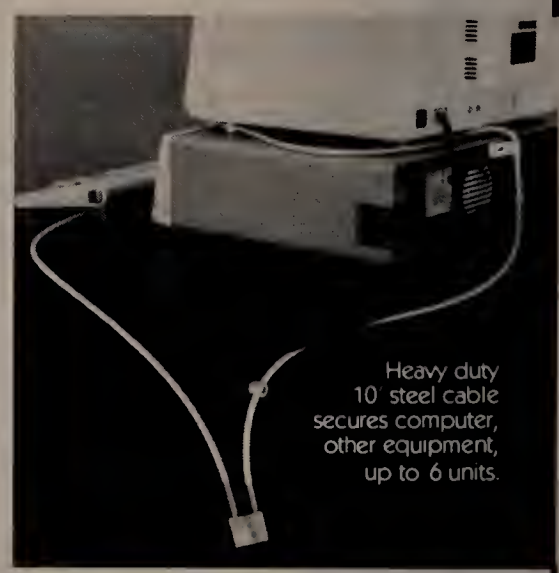

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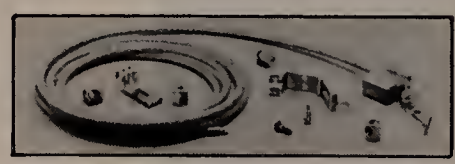

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this problem from occurring in the future.

Meanwhile, Mr. Berryman has called us to let us know that the replacement cable has solved his problem.

James T. Schraith
Vice President, Service

A Job Well Done: CTX International

I bought a CTX 2400 monitor based on a favorable review in your August 1988 issue (see "Viewer's Choice: 13 Monochrome Monitors"). Four months later the reverse mode (black letters on a white screen) went out, and I was left with a blank screen. The dealer indicated a repair time of 7 to 10 days, and no loaners were available.

I couldn't afford to be down that long, so I called CTX. The company offered to repair the monitor if I could get it to the CTX site. I drove for two hours to a smoggy corner of the Los Angeles basin and dropped it off before noon. I had a burger, read the paper, and then returned to pick up my repaired monitor (free of charge).

I just thought you'd like to know that CTX deserves the Best Buy rating you gave it.

Jon Purdy
Poway, California

To send correspondence or to submit material for publication in this column, please see How To Contact PC World, page 4. ●

POWER TIP NO. 62

Reduce MCI Costs by Single Spacing

MCI Mail users may or may not know that the E-mail service charges for line spacing. A single-spaced *PC World* file took up 7577 characters. When it was sent double-spaced (as some people might do without thinking when that's a file's original format), MCI considered it an 8173-character file. You pay for the carriage returns. Send your files single-spaced and save a few bucks.

Robert Luhn
Senior Editor

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PC WORLD

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Last year, *PC World* designated National Software Testing Laboratories as its official research facility. And for good reason.

NSTL is the leading independent research organization exclusively devoted to testing PC hardware and software. Our knowledge, experience and skilled technical staff enable us to generate analytical data so accurate, comprehensive and meaningful that no one else can match it.

PC Digest is our comparative ratings report on IBM-compatible PCs and peripherals. It's the *authoritative* source for objective, scientific hardware evaluations.

Granted, this unusual publication is not for everyone. But if you need to go *beyond* the ads and the reviews...if you require a *deeper level of analysis*...if your work calls for *complete* and *systematic* data to guide your buying decisions...then *PC Digest* is the only place to turn.

The ultimate hardware reference tool.

Today, the PC marketplace is more crowded and confused than *ever* before.

PC Digest evaluates a wide range of PCs and peripherals.

How can you be *certain* a piece of equipment will prove reliable? That it will do all it claims? That it will be compatible with your existing system? How can you make truly *informed* buying decisions?

There's only one *sure* way to evaluate the hundreds of competitive products. They must be *tested*. Head-to-head. Feature by feature. Against precise, scientific benchmarks. Performing real-world business tasks.

Only *PC Digest* performs this exacting research process. There is no other resource that even comes close.

Every major PC and peripheral is evaluated.

New equipment is a major investment. And, for most organizations, buying PCs and peripherals is a *continuous* process — not a one-time event.

Skilled engineers spend weeks methodically testing each piece of equipment.

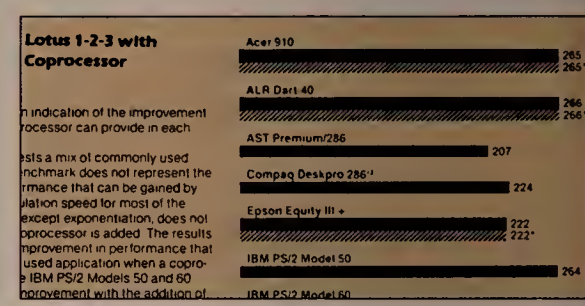
PC Digest can help you make the *right* decisions — and *avoid* expensive mistakes. Arriving each month, it's an *ongoing* reference source for a wide range of products. For example:

✓IBM and compatible 286 and 386 machines ✓Laptops ✓Modems ✓Laser printers Backup systems ✓VGA boards ✓Monitors ✓Network adapters ✓Memory expansion cards ✓Disk drives ✓Hard disk cards ✓Other mass storage devices ✓Accelerator boards ✓Dot-matrix printers ✓Co-processors ✓Scanners ✓And more

For each product, we determine: How easy is it to set up? What are its features and capabilities? What special system requirements are necessary? How well does it work with major business software? How fast does it perform typical tasks? How good is the documentation? How does it function under DOS and OS/2?

We tell you which products are *best* — and which have *problems*. And we make *specific recommendations* based on the hard data our tests uncover. (Specifications and prices are included.)

Users applaud *PC Digest*'s graphic format. Test results are clear, readable and accessible. Quick-reading charts show how products stack up against each other.



Benchmark test results show how each product scored while running major business software programs.

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Why is *PC Digest* so widely used — and so highly regarded?

For a start, no one else can equal NSTL's resources. Our laboratory facilities are state-of-the-art. Our staff of skilled engineers and technicians draws upon a wealth of "hands-on" experience that can be gained only by scientifically testing PC products day after day.

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"*PC World* has entered into an unprecedented arrangement to have our review process conducted by National Software Testing Laboratories.... NSTL has the reputation for undertaking the most comprehensive performance and versatility tests of software and hardware products in our industry....They're going to *tell* it like it is — not *sell* it like it is."

— **David Bunnell,** Chairman

"We've recognized the increasing need for performance testing that measures products from a real-world perspective....That's why we have selected National Software Testing Laboratories of Philadelphia, Pa. as the exclusive test facility for all products reviewed in *PC World*."

— **Richard Landry,** Editor

"*PC World* is proud to include benchmarks and evaluations from the industry's leading source of unbiased product information....NSTL has earned a reputation as the Underwriters Laboratories of the PC industry. Renowned for its exacting, objective methodology, [its] solid reputation has been built by a staff as fastidious as a team of wary tax auditors."

— **Eric Knorr,** Senior Associate Editor

go to test equipment?

esting lab.

Performance tests are *applications-based*. We test machines with popular software such as the major spreadsheet and database programs. In contrast, many magazine reviews use misleading "raw processing" benchmarks that bear little relation to real-world business tasks. And the loose-leaf data services, despite their imposing appearance, perform *no* testing at all.

PC Digest is fiercely independent. We have a firm policy of accepting *no ads*. That gives us the freedom to be *fully objective and unbiased* in our product evaluations.

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Speeds up IBM PC-1	Y	Y	N	Y	Y	Y,R	Y	N
Speeds up IBM/XT	Y	Y	N	Y	Y	Y	Y	Y
Speeds up IBM/AT	N	N	Y	N	N	N	N	N
Microprocessor	80286	80286	80386	8086	80286	80286	80286	80
Memory Cache	16K	8K	64K	8K	N	8K	8K	12
On-board memory	N	N	OP1	N	1024K	N	N	N
Computer processor retained	N	Y	N	N	Y	N	N	N
Change Speed	Y,S	Y,S	Y,S	Y,E	Y,S	Y,I	Y,I	Y,
Change speed without rebooting	Y,S	N	Y,S	Y,E	Y,S	N	N	Y
Change speed within application	N	Y,K	Y,K	N	N	N	N	N
Disk caching included	Y	Y	N	N	Y	N	N	Y
RAM disk included	N	Y	N	N	Y	N	N	Y
Print spooler included	N	Y	N	N	Y	N	N	Y
Long/short card	SH	SH	L	L	L	SH	SH	L

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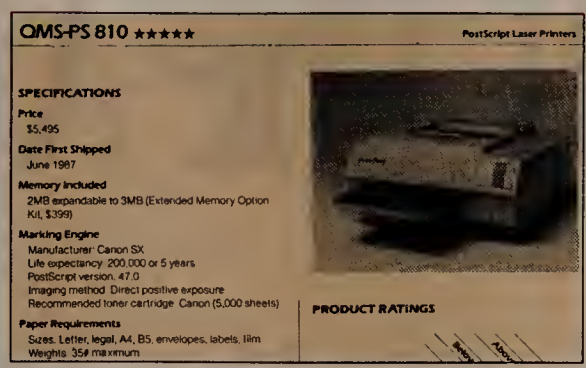
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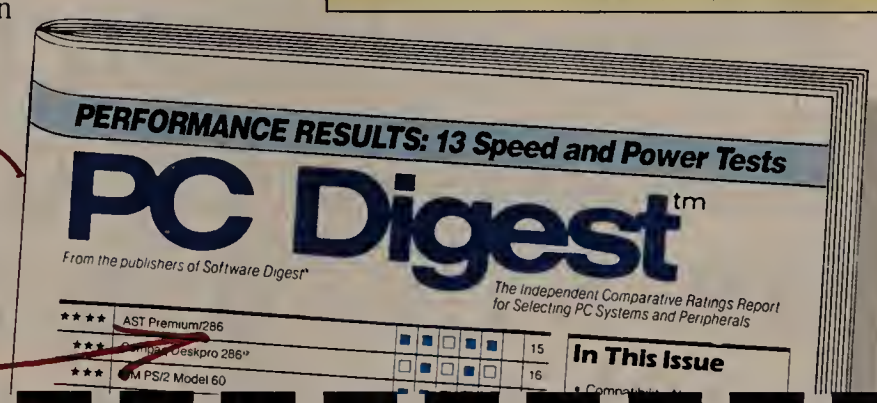

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Improve dBASE error trapping, add math functions to Turbo Pascal, learn a Tandy keyboard's secrets, cautiously explore SUBST, and develop applications for Windows and Presentation Manager simultaneously.

Edited by Tom Swan

dBASE With All the Trappings

The "Ready, Set, Print" item [*.*, *PCW*, January 1989] explains how to detect an off-line or nonexistent printer by calling a separate assembly language test routine from within a *dBASE* .PRG program. However, *dBASE III* offers a simpler and wider-ranging facility that can trap that and other errors.

For example, the command IF ERROR()=125 tests for an off-line printer.

Using these functions, you can write a procedure such as ERRTRAP.PRG [see **LISTING 1**], which traps *all* errors generated by other *dBASE* programs and displays an error number with the appropriate message.

First, suppress *dBASE*'s built-in error trapping by issuing the command ON ERROR DO ERRTRAP. Subsequently, if an error occurs while running a .PRG program file, ERRTRAP prompts you to press R to retry the offending statement or C to continue the program. Calls to ERROR() and MESSAGE() display the *dBASE III* error number and explanatory text.

Michael Ross
Carlsbad, California

New Math for Turbo Pascal

Programming with *Turbo Pascal*, I missed some favorite math functions from BASIC and FORTRAN. So I wrote a *Turbo Pascal 5.0* math unit to modify the language to my liking.

MATH.PAS [see **LISTING 2**] includes a function to raise numbers to a specified power. Other functions calculate base-10 logarithms, convert between radians and degrees, and compute factorials, permutations, and combinations.

Compile MATH.PAS to disk, creating MATH.TPU. To use the functions in another program or unit, insert *USES Math;* after the PROGRAM or UNIT declaration. Also, add the compiler directives {$N+,E+} to enable *Turbo Pascal*'s numeric coprocessor and emulator abilities.

Keith Hattes
West Point, New York

Editor's note: For Turbo Pascal 4.0 *only: If you have a numeric coprocessor, change the directive {$N+,E+} to {$N+}; otherwise, omit the directives and change the Double data types to Real.*

(continues)

```
@23,0 say 'ERROR '+STR(ERROR(),3)+' DETECTED: '
?? MESSAGE()            && Defines ERROR() of preceding line.
store 'R' to waitkey
@24,0 say 'Strike <R>etry or <C>ontinue.'
get waitkey picture '!'
read
@23,0 clear
if waitkey='R' retry && Continue calling PRG at error-causing line
else return          && Continue calling PRG after error-causing line
endif
```

LISTING 1: ERRTRAP.PRG replaces dBASE's normal error-handling logic.

ANTHONY RUSSO

Secret Keys for Tandy PCs

My Tandy 1000SX keyboard makes it hard to run programs that use certain key combinations. By experimenting, though, I found several secret keys that do the jobs of others.

For example, *SideKick* lets you press <Scroll Lock> and then move pop-up windows around the screen with <Cursor Left> and <Cursor Right>. Since there's no <Scroll Lock> key on my Tandy, I thought I couldn't use this feature. But I discovered that pressing <Alt>-<Break> toggles the words 'Scroll Lock' on and off the screen. When they're on, the cursor keys work as expected.

On most PCs, you can press <Ctrl>-<Insert> to copy marked *QuickBASIC* statements into a temporary buffer and then press <Shift>-<Insert> to copy the lines to a new cursor position. <Ctrl>-<Insert> doesn't work for me, but <Ctrl>-<Delete> deletes marked text (also placing it in the buffer), and <Shift>-0 (that's the 0 on the numeric keypad) inserts buffered text at the cursor. Then, to restore deleted text, just press <Shift>-0 again at the original spot.

With *XyWrite*'s on-screen help menus, pressing the numeric keypad's 2, 4, 6, and 8 keys instead of Tandy's cursor keys moves the menu selector as ordered.

James B. Sullivan
Garden City, New York

```
(* Turbo Pascal 5.0 Math Functions by Keith A. Hattes *)
unit Math;
{$IFDEF VER40} {$N+} {$ELSE} {$N+,E+} {$ENDIF}

interface
Function Power( base, exponent : Real ) : Real;  { Power of base raised
                                                                 to exponent }
Function Log( argument : Real ) : Real;   { Log (base 10) of argument }
Function Rad( degrees : Real ) : Real;    { Convert radians to degrees }
Function Deg( radians : Real ) : Real;    { Convert degrees to radians }
Function Fact( x : Integer ) : Double;    { Factorial of x }
Function Perm( n, r : integer ) : Double; { Permutations of n taken r at
                                                                   a time }
Function Comb( n, r : Integer ) : Double; { Combinations of n taken r at
                                                                   a time }

implementation
Function Power( base, exponent : Real ) : Real;
   begin
      Power := Exp( exponent * Ln( base ) )
   end; { Power }
Function Log( argument : Real ) : Real;
   const BASE = 10;
   begin
      Log := Ln( argument ) / Ln( BASE )
   end; { Log }
Function Rad( degrees : Real ) : Real;
   const DEGCONVERT = 180.0;
   begin
      Rad := Degrees * Pi / DEGCONVERT
   end; { Rad }
Function Deg( radians : Real ) : Real;
   const RADCONVERT = 180.0;
   begin
      Deg := Radians * Radconvert / Pi
   end; { Deg }
Function Fact( x : Integer ) : Double;
   var   loop : Integer; mult : Double;
   begin
      mult := 1;
      For loop := 1 To X Do
         mult := mult * loop;
      Fact := mult
   end; { Fact }
Function Perm( n, r : integer ) : Double;
   begin
      Perm := Fact( n ) / Fact( n - r )
   end; { Perm }
Function Comb( n, r : Integer ) : Double;
   begin
      Comb := Perm( n, r ) / Fact( r )
   end; { Comb }
end. { Math unit }
```

LISTING 2: MATH.PAS adds missing math functions to Turbo Pascal.

Quick Substitutions

The cautions about not using SUBST in AUTOEXEC.BAT ["Relief Mappings," *.*, *PCW*, February 1989] came as a surprise. I haven't had any problems as a result of assigning subdirectories virtual drives from G: to Z:. That lets me use drive commands like W:<Enter> to change directories instead of typing long CD commands. For example, after booting with the

(continues)

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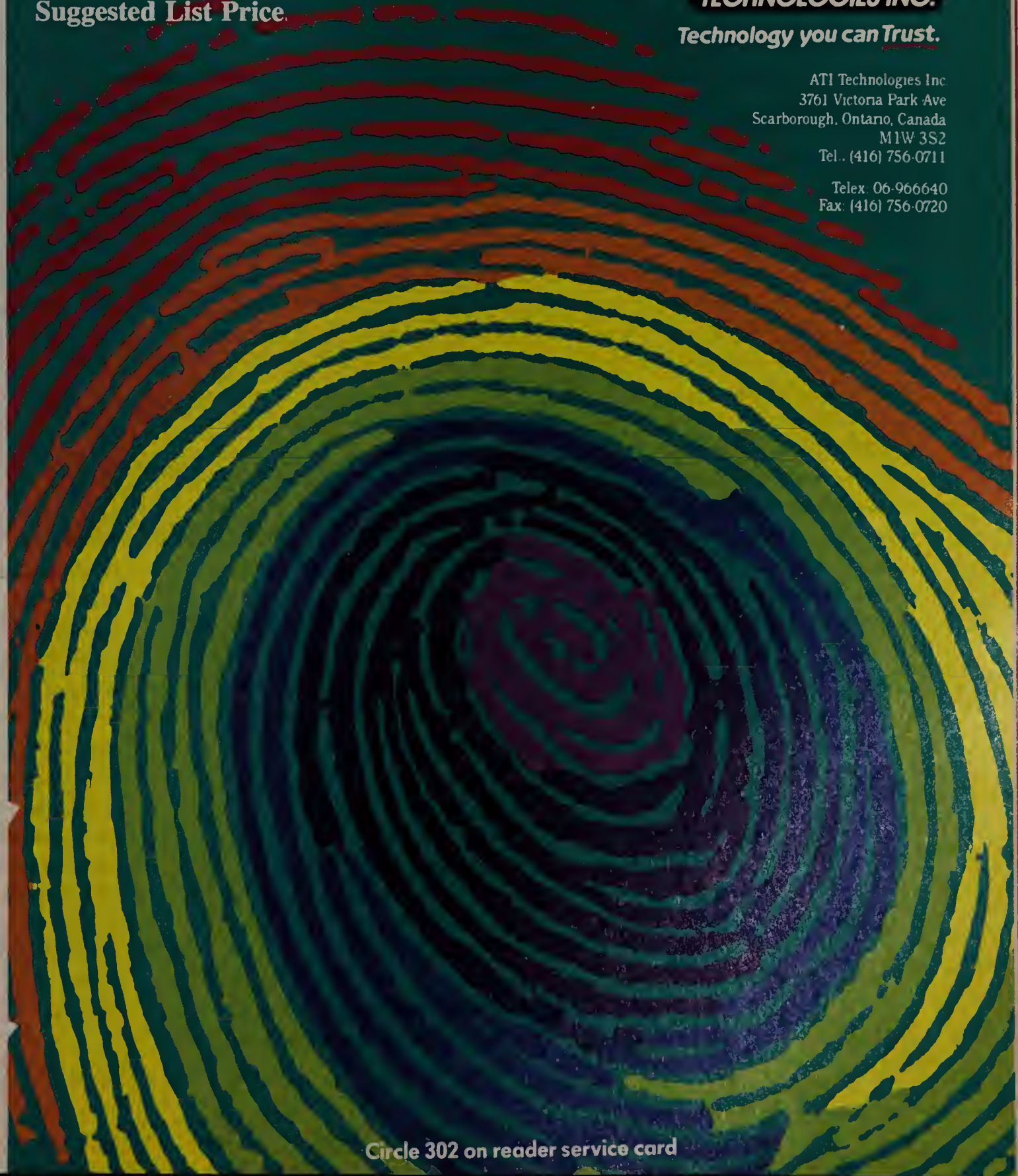

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line SUBST S: C:\LOTUS-\SPREADSH in my AUTOEXEC.BAT file and LASTDRIVE=Z in CONFIG.SYS, I simply type S:<Enter> to switch to my C:\LOTUS\SPREADSH subdirectory.

David F. Siemens, Jr.
Mesa, Arizona

Editor's note: A lot of people use SUBST but are unaware of the possible conflicts between it and other DOS commands. According to the MS-DOS Encyclopedia *(Microsoft Press, Redmond, Washington, 1988), "The SUBST command masks the actual disk drive characteristics from commands that perform critical disk operations. Therefore, ASSIGN, BACKUP, CHKDSK, DISKCOMP, DISKCOPY, FDISK, FORMAT, JOIN, LABEL, and RESTORE should not be used on a drive affected by a SUBST command. CHDIR, MKDIR, RMDIR, and PATH commands that include the affected drive should be used with caution. A network drive cannot be named in a SUBST command." So by all means use SUBST. But never use any of the critical commands with drive substitutions.*

Tom Swan is a contributing editor for PC World *and the author of* Mastering Turbo Pascal 4.0 *(Howard W. Sams & Co., Indianapolis, Indiana, 1988) and* Mastering Turbo Assembler *(Howard W. Sams, 1989).*

To send correspondence or to submit material for publication in this column, please see How to Contact PC World, page 4. ●

DEVELOPER'S TOOLBOX

From Windows to OS/2

By cross-developing applications for *Windows* and OS/2 Presentation Manager (PM), you now can corner two markets with the same code. That is, you can take advantage of the existing *Windows* market and at the same time gear up for OS/2. The key is to select your *Windows* tools carefully. Make the right choices now, and you'll save months of headaches later when you port your applications from *Windows* to PM. All the tools mentioned this month have source-code–compatible *Windows* and PM versions available now, or will in the near future.

One of the best of this bunch is *Bridge*, a batch file processor for *Windows/286* and *Windows/386*. With *Bridge*, you create "workstations" that combine other applications—for example, *Excel* and *dBASE*—in a shell complete with custom pulldown menus and dialog boxes. *Bridge* is simple to use. Just enter batch file commands with the *Windows* Notepad editor, then run the file. You can also automate this step to create turnkey *Windows* systems that load a preset configuration at start-up. *Bridge*'s batch commands are much more powerful than DOS's and include the abilities to call subroutines, pass control to other batch files, and use IF and FOR statements. After installing *Bridge*, I was able to start programming in minutes—the fast-reading tutorial explained everything I had to know.

If you need more power than the stand-alone *Bridge* provides, you can purchase the *Bridge Tool Kit*, which includes batch file and dialog box editors plus utilities to encrypt batch files, attach icons, and access *Bridge*'s interprocess control. Because the *Bridge Tool Kit* is expensive, you may want to start with plain *Bridge*, which should be adequate for all but the most sophisticated requirements. But it's nice to know the extra power is available should you need it.

For those who plan to develop custom applications from scratch, selecting a language is more difficult. The barebones approach is to use *Microsoft C 5.1* (see "Developer's Toolbox," *.*, *PCW*, October 1988) along with the *Microsoft Windows Software Development Kit (SDK)*. This combination requires a thorough knowledge of C and *Windows* programming—a big reach, even for experienced programmers.

C experts who are new to *Windows* will find *CASE:W* just the ticket for getting started. (The OS/2 version, *CASE:PM*, arrived as I was writing this.) The application generator offers a point-and-click approach to *Windows* and PM development, letting you design an application out of preformed building blocks. *CASE:W* and *CASE:PM* generate C source code that re-creates your application design. After adding custom routines to the stock output, you simply compile and link to create the final product. Fortunately, the complex steps required to accomplish this are fully automated.

If C is not your bag, then you won't find a better *Windows* development environment than *Actor*. This language product, which resembles C and Pascal, is purely object oriented, a buzzword you'll be hearing a lot in the coming months. Unlike other languages such as

(continues)

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DEVELOPER'S TOOLBOX

(continued)

C++, *QuickPascal*, and the new *Turbo Pascal 5.5*, all of which feature object-oriented extensions, everything in *Actor* is an object—from the lowliest character to the loftiest window.

This pure approach to object-oriented programming fits in well with the added complexity of developing *Windows* and PM applications. But it also requires programmers to learn a new language, a commitment not to be made lightly. One way to get some help is to study the public domain *Actor* application *PC-Project*, available from Whitewater on disk for $5 or free of charge through the company's BBS. The disk includes a wealth of objects (called classes in *Actor*) in source code form that you can extract for your own work. And the program is actually useful—rare for a demo.

I welcome your comments. My MCI Mail and BIX handle is TSWAN; my CompuServe ID is 73627,3241.

—*Tom Swan*

WHERE TO BUY

Actor
The Whitewater Group
Technology Innovation Center
906 University Pl.
Evanston, IL 60201
312/491-2370
LIST PRICE: $495
REQUIREMENTS: 640K, DOS 2.1 or later version, Windows/286 or Windows/386
TECHNICAL SUPPORT: limited free support for registered users, additional support plans available
OTHER SUPPORT: company BBS
Reader service no. 630

Bridge, Bridge Tool Kit
Softbridge
125 Cambridge Park Dr.
Cambridge, MA 02140
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Caseworks, Inc.
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Atlanta, GA 30338
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REQUIREMENTS: 2MB, OS/2 1.1
TECHNICAL SUPPORT: unlimited, no toll-free number, M–F 8:30–5:30
OTHER SUPPORT: company BBS
Reader service no. 632

CASE:W
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With *ProComm* and *ProComm Plus*, some monochrome monitors don't display all the text or highlighting on the help screens. If missing text is a problem, try starting the program with the /B option to use *ProComm*'s black-and-white settings. Type ProComm/B and you'll be able to see the status line and all text.

Phil James, director of technical support, Datastorm Technologies

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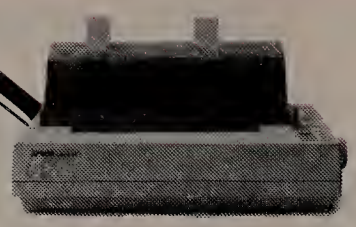

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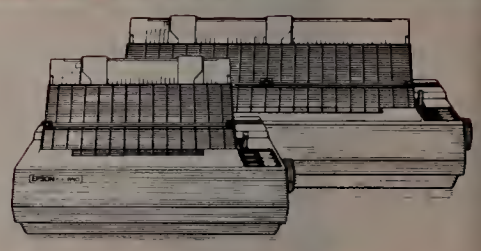
- 88 cps in Near Letter Quality
- 6K buffer
- SmartPark paper handling

Options

- Tractor Feed
- Cut-sheet feeder
- 32K buffer

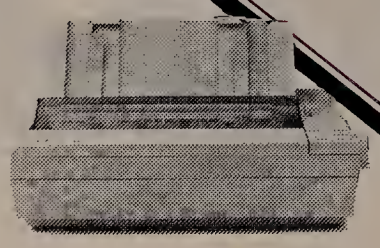


FX-850 FX-1050

- 264 cps in draft Elite mode
- 54 cps in Near Letter Quality
- 8K buffer
- 136 column (FX-1050)
- Friction and tractor feed
- Automatic single-sheet loading
- Front panel controls

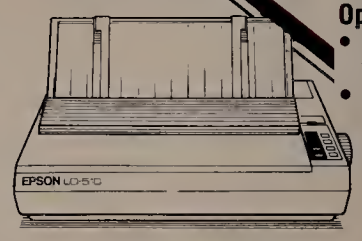
Options

- Cut sheet feeder w/envelope feed capability
- Serial interface



LX-810

- 180 cps in draft mode
- 30 cps in Near Letter Quality mode
- 8K buffer
- 80 column
- Friction and tractor feed
- Automatic single-sheet loading
- Front panel controls
- IBM ProPrinter character set

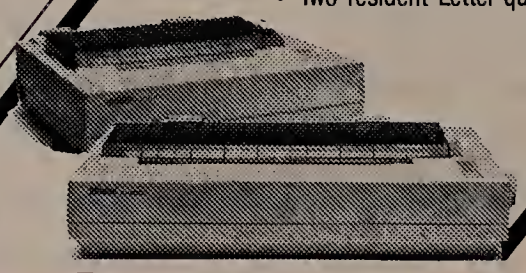


LQ-510

- 180 cps in draft mode
- 60 cps (12 CPI) in Near Letter Quality mode
- Friction and Tractor feed
- Automatic single-sheet loading
- Two resident Letter-quality fonts
- "Shadow" and "Outline" print
- Front panel controls

Options

- Cut-sheet feeder
- LQ software for Microsoft Windows

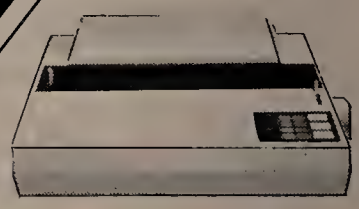


LQ-850 LQ-1050

- 264 cps in draft mode
- 88 cps in Near Letter Quality mode
- 6K buffer
- SmartPark paper handling
- Front panel controls

Options

- Tractor Feed
- Cut-sheet feeder
- 32K buffer



EX-800

- 300 cps (12 CPI) in draft mode
- 54 cps in Near Letter Quality mode
- 8K buffer
- 8 typestyles
- Front panel controls
- Push tractor feed
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NETWORK Q&A

Tips and strategies for departmental networking

Connecting a TOPS LAN and a NetWare LAN is easier than linking other incompatible networks—but expect some limitations.

David Ferris

Q. *How do you interface two LANs with different LAN operating systems? Can you connect a Novell* NetWare *LAN running on a 3Com Ethernet with a* TOPS *network running on Farallon's PhoneNet?*

Noshir Contractor
Urbana, Illinois

A. Ideally, every LAN in your company would share the same LAN OS so that you could easily share data and peripherals between departments. Yet most companies move to LANs in piecemeal fashion, with one department adopting Novell, another 3Com or Sun Microsystems' *TOPS*, and so on.

What's the solution? You could standardize on a single LAN OS, but that's expensive and disruptive. Or you could wait a year or so for streamlined inter-LAN links to arrive. But if you need connectivity *now*, you can link disparate LANs with a homemade gateway. It's no simple task, and communications are limited, but the results may justify the pain.

Bridging a peer-to-peer LAN OS, such as *TOPS* or IBM's *PC LAN Program*, to a server-based LAN, such as *NetWare*, *3+Share*, or *Vines*, is relatively easy. It's much easier than connecting, say, *NetWare* to *3+*, and the bridge is far more complete. However, the link is one-way only (*TOPS*-to-*NetWare*), you'll encounter numerous incompatibilities, and you must dedicate a PC to act as a gateway.

Forging the TOPS to NetWare Connection

TOPS networks are attractive because they're easy to set up and use, and they can integrate Macintoshes and PCs. Unlike a *NetWare* LAN, which depends on a central server, *TOPS* is based on a peer-to-peer topology. Every workstation on the LAN can share its directories and printers by issuing the Publish command, and can access anyone else's "Published" resources with the Mount command.

TOPS workstations can be rigged with AppleTalk or ethernet cable, but most *TOPS* LANs use Farallon Computing's twisted-pair PhoneNet cabling and Sun's FlashCard adapters. This example links a PhoneNet *TOPS* LAN to an ethernet *NetWare* setup, but the approach is similar with other cabling.

To bond *TOPS* and *NetWare* you must dedicate a computer to act as a gateway. An XT will suffice, but you'll want 640K of RAM to accommodate both LAN OS shells. This setup lets *TOPS* workstations access as many as 22 *NetWare* server subdirectories—as long as each subdirectory is mapped to the gateway PC as a logical drive. Essentially, you fool *TOPS* into thinking the *NetWare* directories are local drives on the gateway PC.

All *TOPS* users can access *NetWare* files and printers, but not vice versa. With this setup, *TOPS* users can even run programs that reside in the mapped directories. (Obviously, however, Mac users can't run PC programs.) *TOPS* users can access only those directories mapped to the gateway PC; search drives (Novell's equivalent of DOS paths) don't work.

The task requires experience with both LAN OS's. First, place both a *TOPS* FlashCard and an ethernet card in the gateway PC and connect each to its appropriate network (see **FIGURE 1**). Next, configure the cards to re-

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ANTHONY RUSSO

TOPS to NetWare: One Way Only

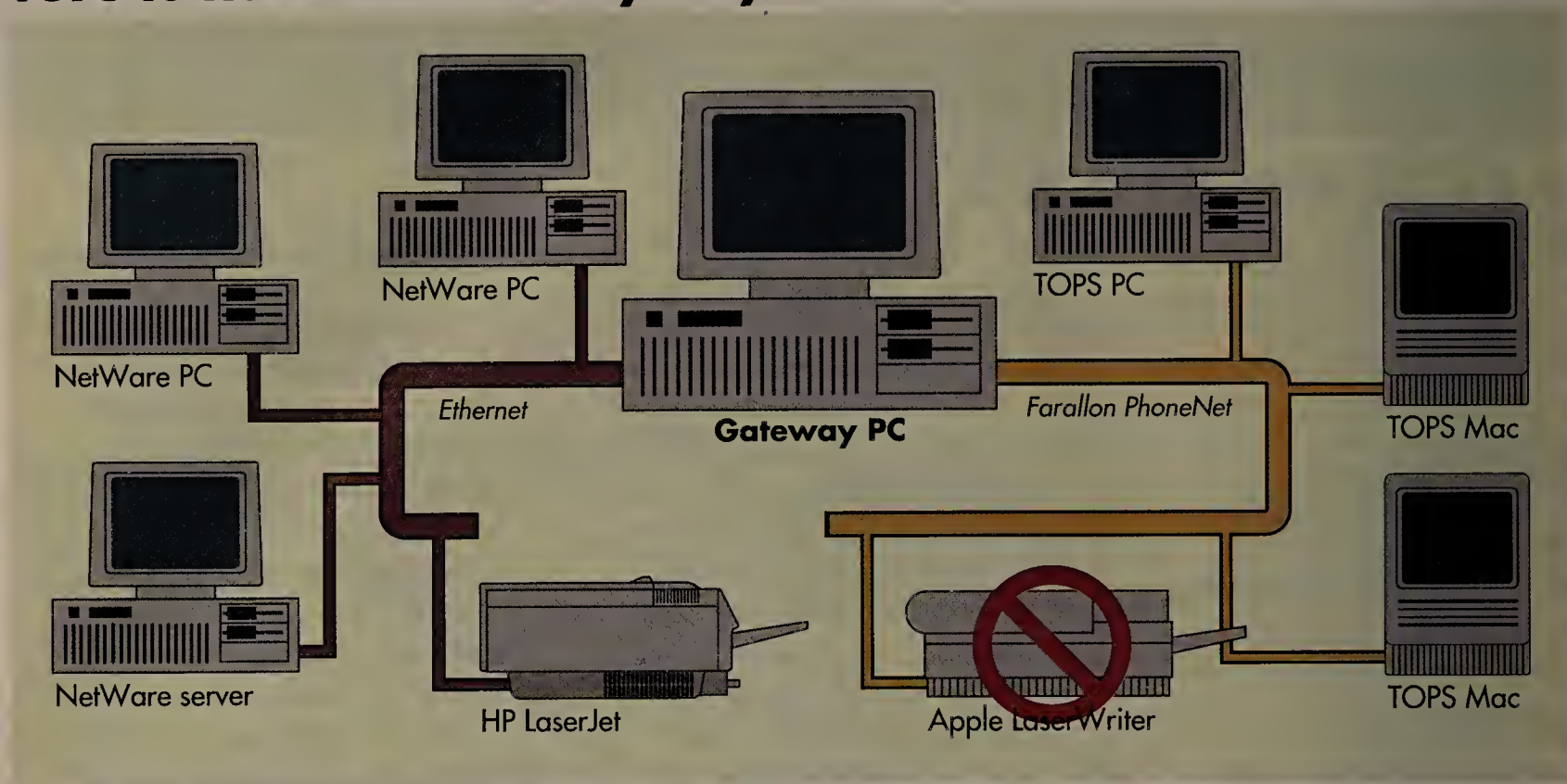

Figure 1: You can set up a TOPS-to-NetWare bridge with a gateway PC that holds both LAN OS adapter cards. TOPS users can access NetWare files and peripherals, but not vice versa, so NetWare users can forget about a free ride on an Apple LaserWriter.

solve interrupt and other conflicts. This entails running *TOPS*'s SETUP.EXE program. Reboot the gateway PC, install *TOPS*, and make sure the gateway is properly configured as a *TOPS* workstation and logged on to the network. Now unload *TOPS* from memory using *TOPS*'s UNLOAD command. Install the *NetWare* shell, and log on to *NetWare*. Map the desired *NetWare* directories to the gateway PC as logical drives.

Exit *NetWare* and return to *TOPS*. Modify the TOPSKRNL-.DAT file, naming the gateway PC and adjusting the drive map to define the *NetWare* logical drives on the gateway as hard drives.

Make sure the proper read/write permissions are defined on the Novell server. If *TOPS* workstations will be accessing active *NetWare* directories, write a batch file that loads *TOPS*'s XDAEMON utility every time you turn on the gateway PC. XDAEMON updates the *TOPS* directory when *NetWare* files are created or deleted. Finally, use *TOPS*'s Publish command to make the gateway's *NetWare* "drives" (the mapped server subdirectories) available to *TOPS*. To access files on the *NetWare* server, a *TOPS* user Mounts the appropriate logical drive.

Expect to run into problems—especially printing problems—when you link incompatible LANs. For example, *TOPS* users can't cancel a print request or query the *NetWare* print queue to see when their print job will be done. However, you can smooth out some of these rough spots by writing batch files.

Other LAN OS Links

You can set up similar one-way connections between *PC LAN* and *NetWare*, and *PC LAN* and *TOPS*. But you can't effectively bridge two different server-based LAN OSs. For example, if you plugged *NetWare* and *3+* cards into a PC and loaded both LAN OS shells, you'd find yourself looking through a locked window. A single user could load *3+*, access a file on the server, save it to disk, reboot, load *NetWare*, and copy the file to the server, but there's no sharing of directories or peripherals.

Other alternatives exist, but they're complicated, and the connections are usually limited to file transfers. For example, if you have the *3+Remote* option running on a 3Com network, a *NetWare* user can dial in with a modem as a remote user and swap files. Users on both LANs can even share files via a department minicomputer or mainframe by calling in across a communications gateway. However, your PC must play the role of a dumb terminal, limiting access.

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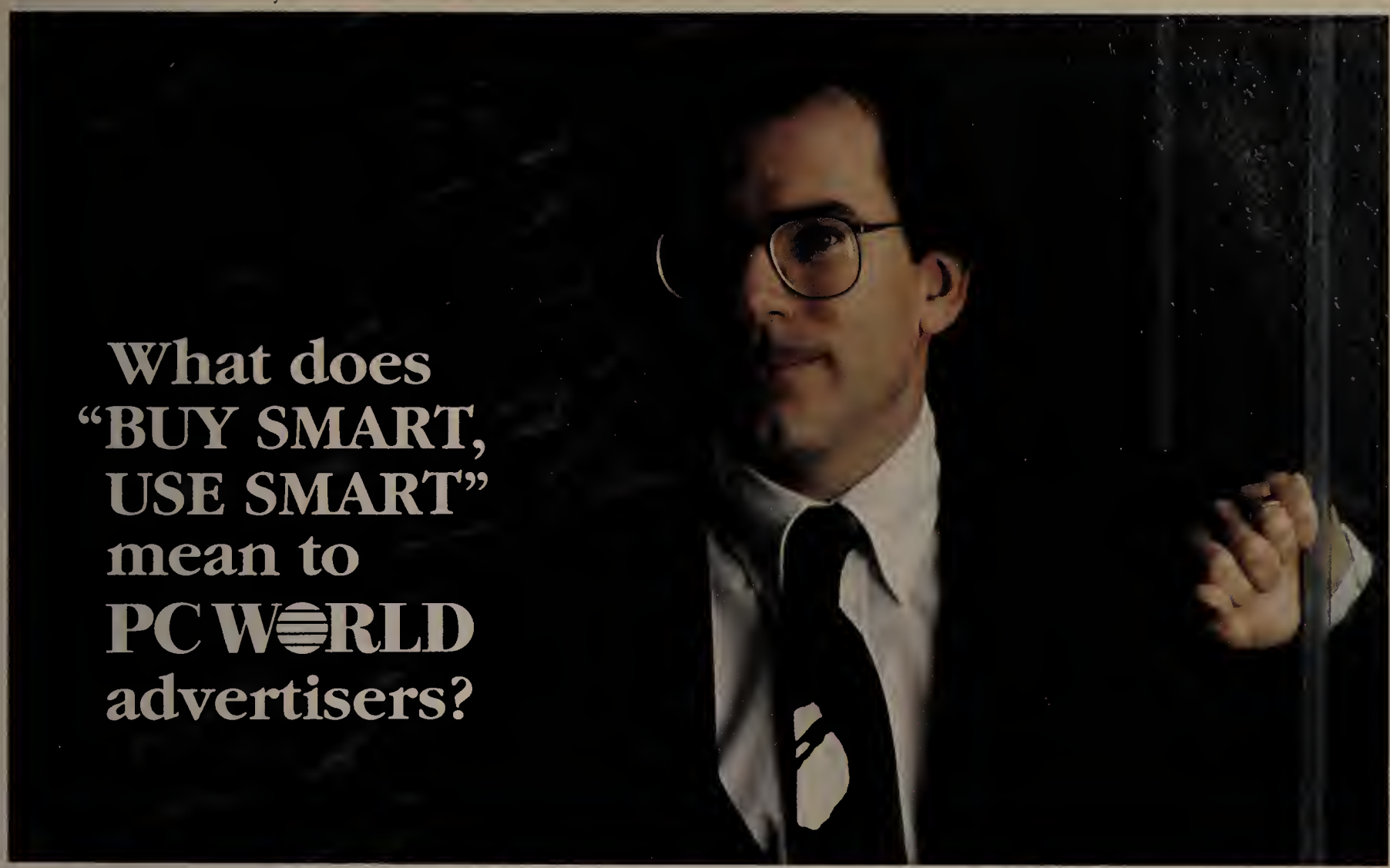
Richard Landry, editor-in-chief, *PC World*



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The Future Belongs to TCP/IP

Fortunately, tailored connectivity products that don't require a dedicated gateway are on the way. Novell and Sun Microsystems have announced a *NetWare* extension due out next year that will provide a streamlined *TOPS*-to-*NetWare* link. Novell's *NetWare for Macintosh* is shipping now, allowing Macs on an *AppleShare* network to access *NetWare* printers and files.

Full two-way file transfers, however, await the adoption of Transmission Control Protocol/Internet Protocol (TCP/IP), a popular data-routing protocol used on mini and mainframe networks. Current TCP/IP options for *3+*, *TOPS*, and *Vines* offer only limited one-way links, and each TCP/IP port is incompatible with the others. However, in a year or two, implementations promised by Novell and other LAN OS vendors should let users on both ends of a link easily exchange files and access each other's files and printers.

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David Ferris is president of Ferris Networks, a San Francisco–based PC dealer specializing in networks.

Trouble on your LAN? Looking for new networking products? Send us your questions. For every question published, you'll receive $25 and a solution to your problem. To send correspondence, please see How to Contact PC World, page 4. ●

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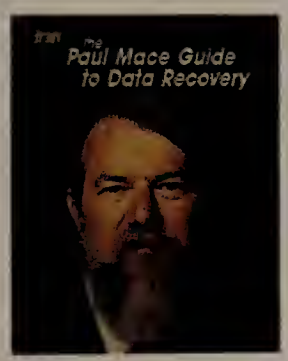

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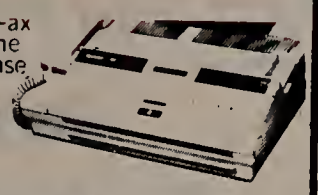

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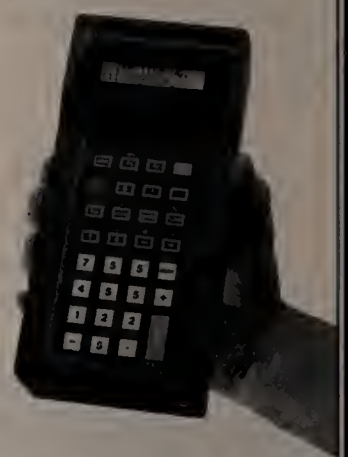

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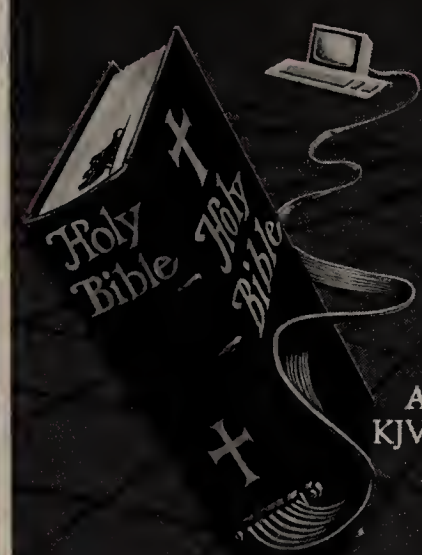

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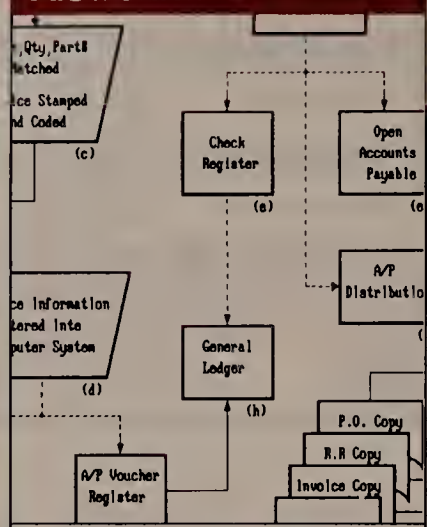

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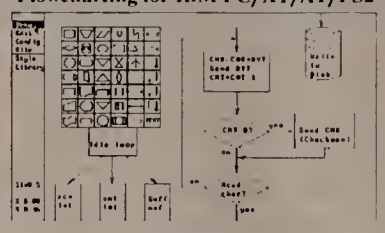

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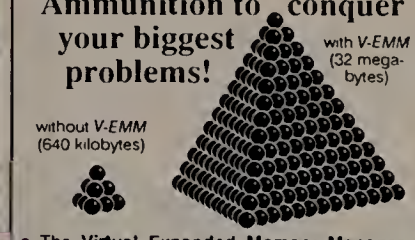

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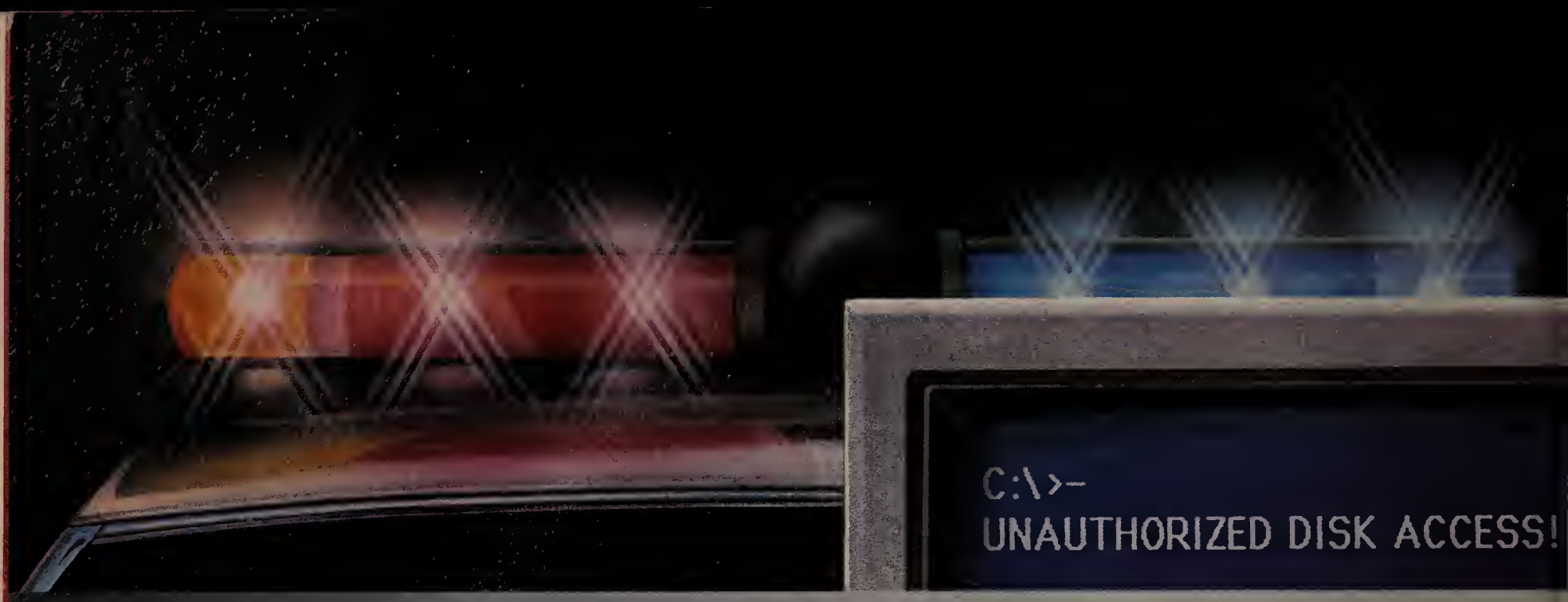

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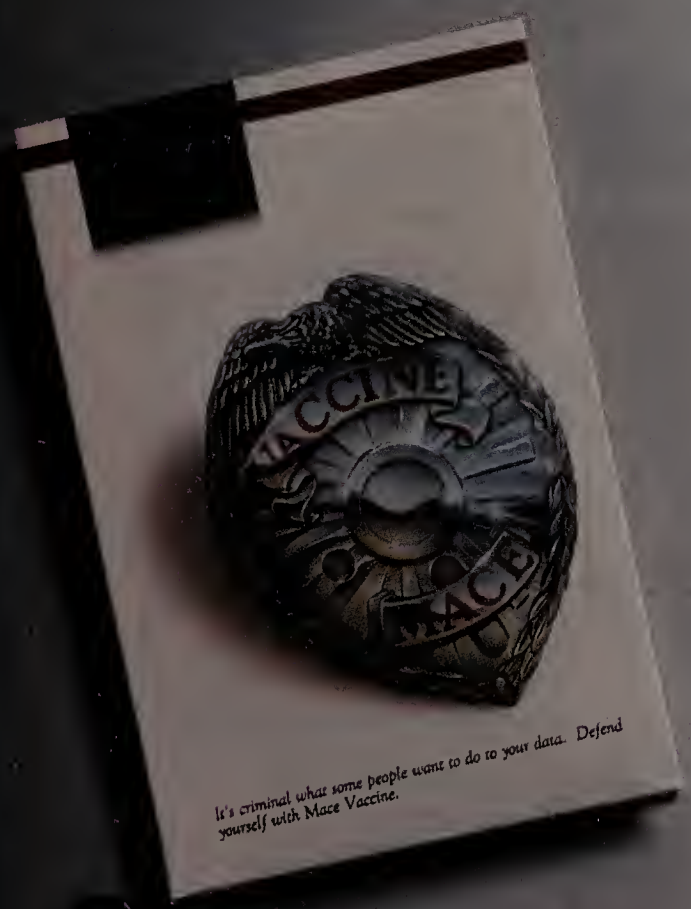

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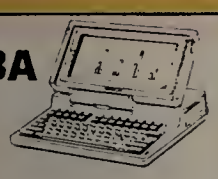

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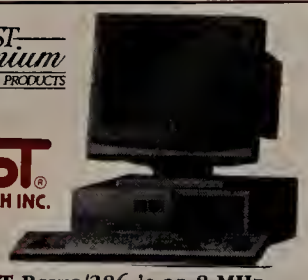

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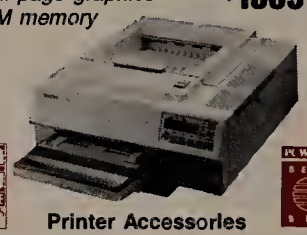

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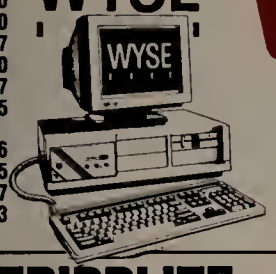

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NEC	
P2200	319
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KXP1191	239
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KXP1524	525
KXP4450	1479
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NX1000	167
NX2400	295
Toshiba	
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P341SL	Call
P351SX	929

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2400B Int Mod	129
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VGA 16 bit 512	349
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40MB AT #251-1	399
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1.44MB 3.5" Floppy	89

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DAC Payroll 3.0	53
Dollars & Sense	Call
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Windows 386	117

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Logitech Serial or Bus	65
Logitech New HiRes	85
Microsoft Serial or Bus	94
Microsoft W/ Windows 286	129
OmniMouse Serial	39
PC Mouse II Serial or Bus	82

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Datasheild 100	57

Programming

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Turbo Basic	60
Turbo C 2.0	90
Turbo Pascal 5.0	90
Quick Basic	60
Quick C	60

Spreadsheets

Allways	82
Excel	Call
Lotus	Call
Lucid 3-D	57
Quattro	145

Utilities

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Desqview	69
Desqview386	99
Fastback Plus	99
FastTrax	37
Formtool	54
Laplink Plus	59
Laplink III	75
MS-Dos 4.01	79
Norton Advanced	74
PC Kwik	Call
PC Tools Deluxe	Call
ProComm Plus	42
SideKick Plus	119
XTree Pro	61

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Easy Extra	55
GEM First Word Plus	117
Grammatik III	49
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Professional Write	125
Rightwriter	47
Sprint	117
Q & A Write	109
Webster's Writer	47
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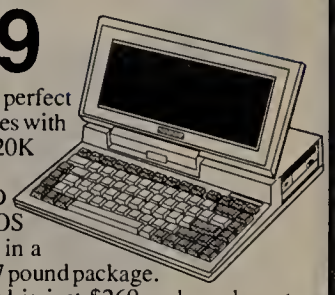
Word Perfect	215
Word Perfect Library	59
WordStar Prof. 5.5	189

Call On Non-Listed Items

SPECIALS

Toshiba T1000

$659



The T1000 is the perfect second PC! It comes with 512K of Ram, a 720K floppy drive, a supertwist LCD screen and MS-DOS in ROM! All this in a battery-powered 7 pound package. A 768K Ram card is just $269 and can be set as base, expanded, or a non-volitile Ram disk.

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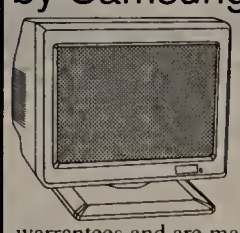

These 14" monitors were purchased from a large PC manufacturer who was overstocked. They are brand new with one year warrantees and are made by Samsung. They are fully CGA compatible and work with PC compatibles. A CGA (640 x 200 resolution) card is just $49 and comes with a printer port. This is the perfect video combo for your new XT or AT clone.

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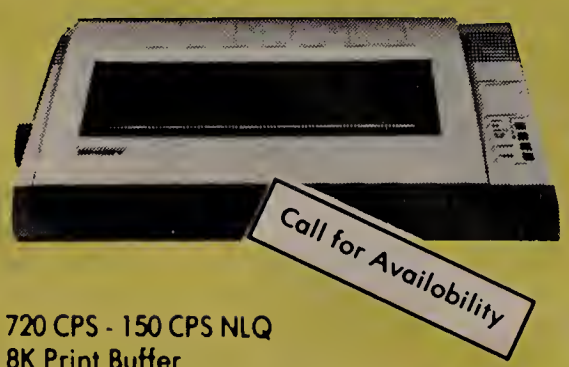

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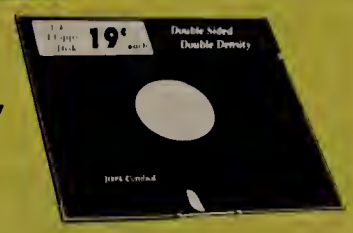

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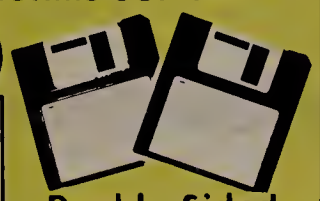

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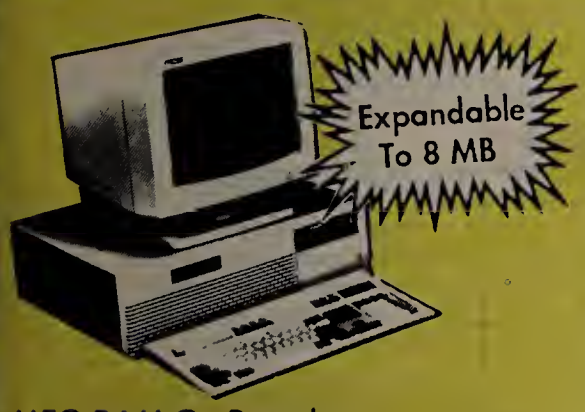

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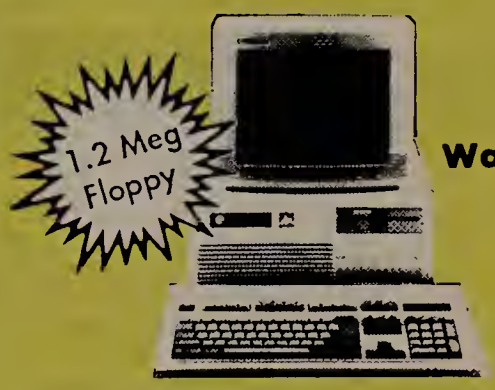

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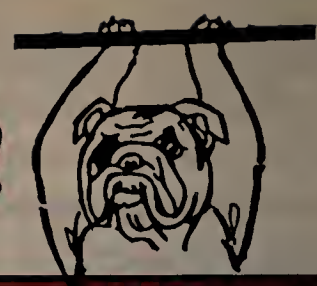

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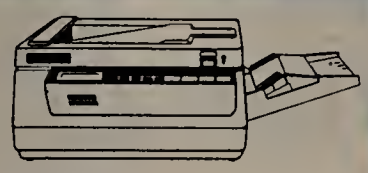

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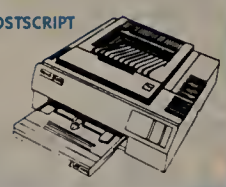

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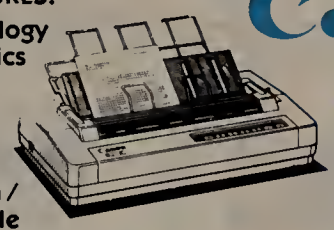

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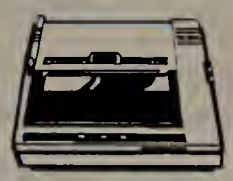

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- Over 70 Keywords, Financial, Statistical, Mathematical, Date, Time, String and Conversion Functions
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- Create Headings
- Copy a Cell Data with "Quick Entry"

DATABASE
- See Many Records At Once in a View Table
- Set Field Data Types to Verify Data and Speed Searching and Sorting
- Expand "Elastic" Fields to Fit Data
- Change Form Design
- Find Records Quickly

GENIUS MOUSE *(Don't settle for a package without one)*

- 3 Button Mechanical
- Serial DB25S
- Hi-Res 350-1050 DPI
- Two User Manuals
- Menu Maker Software
- Mouse Pocket
- Mouse Pad

DR HALO 111 SOFTWARE

- 256 Color Types
- Cut, Copy and Store Pictures
- Create and Store Symbols
- Multiple Choice Fonts
- MGA, CGA, EGA, VGA, PGA
- Large Printer Selection
- Move, Cut and Paste Shapes

ACCESSORIES

- 1000 Sheets Standard Perf 20 Lb Continuous Feed Paper *(Don't settle for unreliable generic disks)*
- 10 DS/DD Sony Diskettes Lifetime Warranty *(Don't settle for unreliable generic disks)*
- 6 Foot Printer Cable
- Surge Protector *(Don't settle for a package without one)*

OPTIONS:	MONO 720x348	COLOR 640x240	EGA 640x350	VGA 640x480
Two 360K Drives	$1,095	$1,275	$1,555	$1,665
One 360K 20MB 65MLS	$1,299	$1,479	$1,759	$1,869
One 360K 30MB 65MLS	$1,329	$1,509	$1,789	$1,899
One 360K 40MB 40MLS	$1,449	$1,629	$1,899	$2,009

the ULTRA PROFESSIONAL ADVANTAGE 286

Complete 286 System w/20 MEG
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ULTRA 286-10 *(Don't settle for less)*

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- Expandable to 1 Meg
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- Enhanced Keyboard 101
- 200 Watt Power Supply
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- Parallel Port
- Game Port
- Real Time Clock
- Power LED Turbo and Reset
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- ST225 20MB 65MLS Hard Drive
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- 720x348 Amber Monitor
- Mono Graphic Card

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- Supports File Caching
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- Window Screens

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- Documents, Graphs, and Charts
- Address Envelopes using Database Entries

GRAPHICS
- Create Text Charts
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- 3 Button Mechanical
- Serial DB25S
- Hi-Res 350-1050 DPI
- Two User Manuals
- Menu Maker Software
- Mouse Pocket
- Mouse Pad

DR HALO 111 SOFTWARE

- 256 Color Types
- Cut, Copy and Store Pictures
- Create and Store Symbols
- Multiple Choice Fonts
- MGA, CGA, EGA, VGA, PGA
- Large Printer Selection
- Move, Cut and Paste Shapes

ACCESSORIES *(Don't settle for only 250 sheets)*

- 1000 Sheets Standard Perf 20 Lb Continuous Feed Paper
- 10 DS/DD Sony Diskettes Lifetime Warranty *(Don't settle for unreliable generic disks)*
- 6 Foot Printer Cable
- Surge Protector-6 Power Outlet *(Don't settle for a package without one)*

OPTIONS:	MONO 720x348	COLOR 640x240	EGA 640x350	VGA 640x480	VGA HI-RES 800x560
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ONE 1.2M 40MB 28MLS	$2,009	$2,239	$2,509	$2,619	$2,779
ONE 1.2M 60MB 40MLS	$1,959	$2,189	$2,459	$2,569	$2,729
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- 8-20 MHz Motherboard
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20Mb ST225 **65ms** **$239**

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These Card Drives use quality MiniScribe drives. Card Drives are available for PC/XT.

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- *Super Fast* . . . 46ms Access Time

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For point-of-sale transactions, the operator simply scans the bar code label on merchandise (or enters transactions through the keyboard) and with one keystroke can produce a complete receipt containing a description of the merchandise, quantity, and discounts, if applicable. The average transaction takes only seconds.

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THE RETAIL STORE

■ 'Pop-up' windows let you select inventory items ■ Pull down menus ■ Suitable for most small Retail stores ■ Track promotional sales ■ Point & Select ■ Multi-level Password protection ■ One Work Screen for all transactions ■ Item or Invoice discounts ■ View 'in stock' condition from Work Screen ■ Refund reports ■ Daily close-out report ■ Automatic price lookup (for invoices) ■ Promotional price lookup ■ Set limited time promotions ■ Accepts manufacturers bar codes ■ Accepts split tender ■ Automatically calculate change ■ Track inventory by size/color/style ■ Flexible tax percentages ■ Reorder reports ■ Receiving reports ■ Bin labels ■ Track sales by salesperson ■ Take markdowns by SKU or Department ■ Sales reports: Department, Employee, Unit sales history, Overall Summary ■ Mailing labels ■ Track customer history ■ Simple price changes ■ Customize features to fit individual business needs ■ Supports bar code readers/cash drawers/keyports ■ Prints on plain paper or custom invoices ■ Links to MICROBIZ bar code printing software ■ Prints 40 or 80 column receipts ■ Links to ACCPAC EASY

THE VIDEO STORE

■ Rentals/sales/returns from one screen ■ Automatically calculates late charges ■ Set different rental rates: Member/Non member, Day of the week, No. tapes rented/day, New Release, Other special price codes ■ Automatically track "free" tape rentals ■ View all tapes a customer currently has checked out ■ Sales and productivity reports by day or for any period ■ Movie list handout ■ Return on investment report ■ Tape income and productivity ■ Overdue rental reports ■ Print mail labels ■ Set up "clubs" ■ View customer history

AUTO REPAIR SHOP

■ Print Work Orders—store info to Work in Progress File ■ Create "package" jobs ■ Charge to house account ■ Automatically markup special order parts ■ Unlimited number of vehicles per customer ■ Bill by job or hourly rate ■ View/print service history ■ Technician productivity ■ Daily parts usage: revenue/margin ■ Daily service income ■ Reminder postcards ■ Inventory reorder report

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- Landmark (0.99): 58.7
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- Super CPUtower case
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- Dual HD/FD 1:1 interleave controller
- 95MB 28ms hard disk
- Multi I/O: 2 serial, 1 parallel, 1 game
- CPU 101 enhanced keyboard
- Monochrome monitor & graphics card
- OS/2, Unix, Xenix, Novell compatible
- User & Technical reference manual
- Complete 72 hour burn in & installation
- Full 1 year warranty all parts and labor

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Same config with Super 386 25/25: **$3499**

SUPER 386 20/20

26.7 Mhz Landmark Benchmark

Highest performance: faster than IBM PS/2 Model 80, Compaq 386/20

20 Mhz and 0 wait state make it ideal for complex data base management, CAD/CAM and Desktop Publishing

- Super 386 20/20 Mhz, 0 wait state
- INTEL ΣΣ 80386 20 Mhz processor
- Socket for 80387 coprocessor
- 1MB 80ns RAM expandable to 10MB
- 95MB 28ms Hard drive
- 1.2MB floppy drive
- 1:1 interleave 16 bit HD/FD controller supports 720K, 1.44MB, 360K drives
- 32K cache memory, 4 way assosciative
- 2 serial, 1 parallel, 1 game port
- Monochrome monitor, graphics card
- CPU 101 enhanced key keyboard
- OS/2, Unix, Xenix compatible

SYSTEM	CPUTower	Desk top
386/20Mhz w/ cache	$2759	$2639
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SUPER 386/16Mhz	$2449	$2349

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26.0 Mhz Landmark Benchmark

At this price this is the best value in the 80286 marketplace. Outperforms any other computer in AT class. An ideal machine for general business applications as well as software development. Offers high speed drive option to Network. BIOS compatibility makes it run all the popular software at any desirable speed.

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- Socket for 80287 math coprocessor
- 65MB 22ms hard disk drive
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- 3 programmable timers and 7 channel DMA
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- OS/2, UNIX, XENIX compatible

SYSTEM	CPUTower	Desk top
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SUPER 286/12Mhz	$1859	$1769

SUPER CPU 286 PORTABLE

- 12Mhz, 0 wait state
- 1MB RAM expandable to 8MB
- 1.44K floppy drive
- 40MB Hard disk drive: Shock mounted; auto park
- 1:1 interleave HD/FD controller supports 720K, 1.44MB, 360K drives
- 2 serial & 1 parallel port
- Non-glare, SUPER TWIST, back lit LCD screen 640x400 resolution
- Padded soft carrying bag
- Dimensions: 16" x 8" x 9"
- Weight: 22 lbs

External 1.2MB floppy drive included
$2059

Same configuration: Super 286/20 Mhz portable
$2249

Super 386/16 Mhz portable with 1MB RAM expandable to 10MB
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Super 386/20 Mhz portable with 1MB RAM expandable to 10MB
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Gas plasma screen 640x400 res
$349

'89 SPECIALS

PS/2Model 30, Model 60, Model 80

CPU 62-PS041	62MB	$799
CPU 130 PS041	133MB	$1599
CPU 160 PS071	152MB	$1599
CPU 250 PS071	241MB	$1999
CPU 330 PS071	330MB	$2399

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ST4096	80MB 28ms	$549
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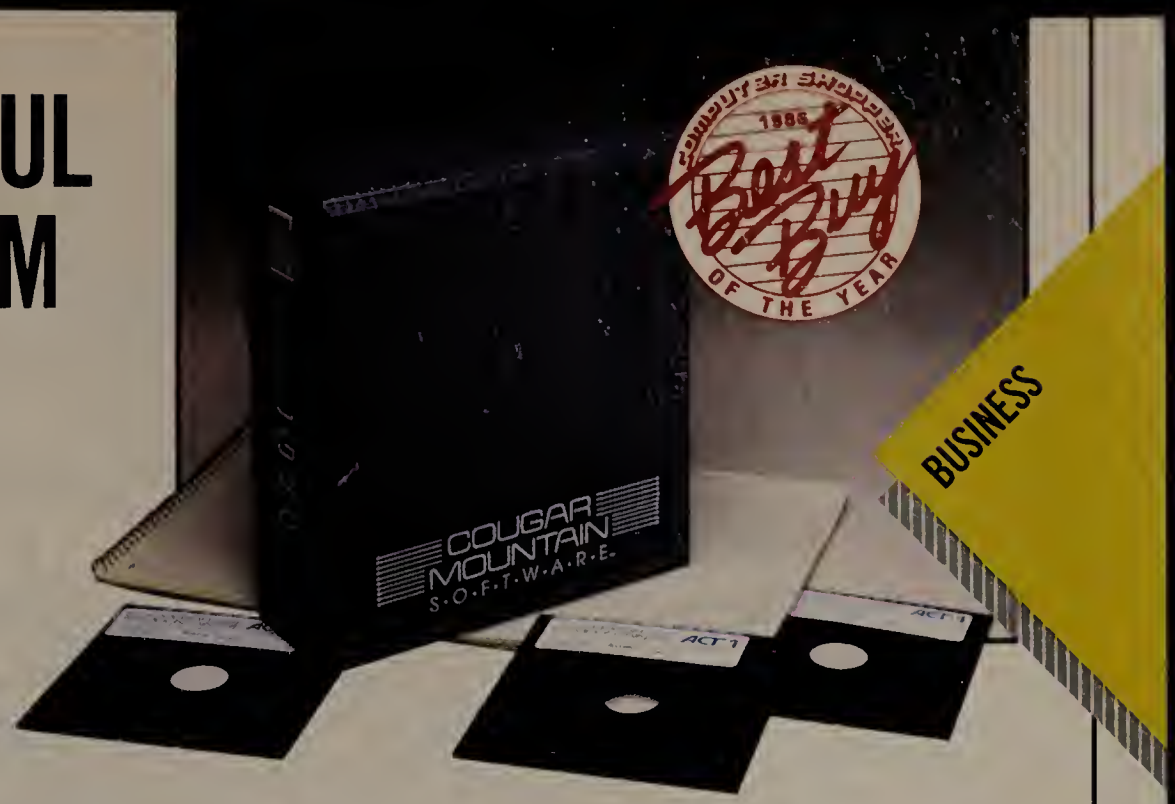

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I Will Not Upgrade

David H. Sherman

It is now 1 a.m. after the first full day of COMDEX Spring. I can't sleep. Some people might try to count sheep, but instead, I'm fast approaching a decision I've postponed since January 1988: whether to spend $150 and upgrade to release 3.0 of *1-2-3*.

I started out predisposed toward release 3.0; after all, I've used *1-2-3* since April 1984. In fact, I bought my IBM PC XT specifically to use the program and have built many worksheet templates—some large, some small, some that worked, some that didn't. I still haven't used all release 2.01's features, but I've run up against enough limitations to make me look forward to what I thought would be a simple, clear upgrade.

My first clue that Lotus doesn't share my goals came with the initial press reports on the marketing of the new package. Release 3.0 undoubtedly has some good features buried somewhere, but Lotus took too much time explaining "New Platforms" and not enough time truthfully answering questions about *3.0*.

My main question is, "How big a spreadsheet can I work with on my XT?" The last answer I got was, "I can't tell you that," followed by, "Be patient."

Since January 1988, I have attended four official presentations of *1-2-3* release 3.0. The first was sponsored by an Ohio-based training organization three days after the local Lotus representatives received an "alpha" copy. The next was during Lotus Development Week in May 1988. The third came when Lotus reps visited a monthly meeting of the Columbus Computer Society. The fourth and last time was three days before official release to selected beta-testing sites.

Unfortunately, Lotus product development people viewed these meetings as talking opportunities rather than listening sessions. My plaintive "What about my XT?" was ignored again and again, while pretty graphics and 3-D worksheets displayed on 386 machines running OS/2 with 4MB of RAM.

Since the release 3.0 road shows began in January 1988, Lotus has led me to believe that release 3.0 would work within the constraints of a 640K machine. Now the official word is that release 3.0 will need a hard drive, at least 1MB of RAM, and an 80286- or 80386-class machine.

I would have to spend $3000 to buy the hardware to use release 3.0. I don't have the money, and I don't want to upgrade to a stripped-down release 2.2 with minimal new features after Lotus promised me the moon.

I'm also concerned about the third-party products I use with *2.01*. Lotus has added some of those packages' best features to *3.0*, and I'm confused as to what impact that will have on my day-to-day use of the add-ins. By providing weak versions of them, will Lotus stifle third parties and end up decreasing *1-2-3*'s functionality for me?

Lotus's lawsuits against competitors also muddy the waters. Could Lotus be sued for including rivals' innovative features (like 3-D) in *3.0?* Sure, Lotus has scared me away from Mosaic Software's *Twin*, but I'm also a little afraid of *3.0* now.

So I've decided not to upgrade to *3.0* nor to recommend upgrading to members of the Columbus Computer Society. Lotus has not listened to users' concerns, has not addressed certain confusing issues, and has further confused issues through lawsuits. I believe Lotus can develop a spreadsheet that is better than its rivals', but *3.0* is not the simple, clean product that I want. ●

David H. Sherman is a Lotus consultant and treasurer of the Columbus Computer Society.

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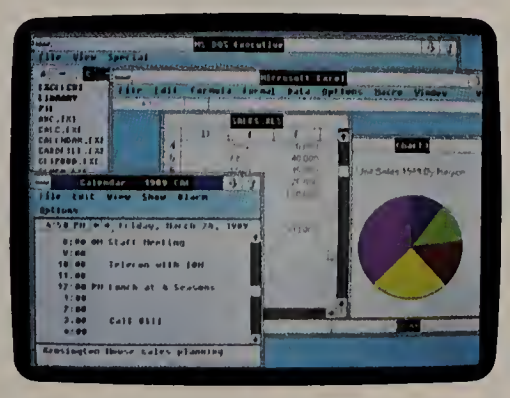

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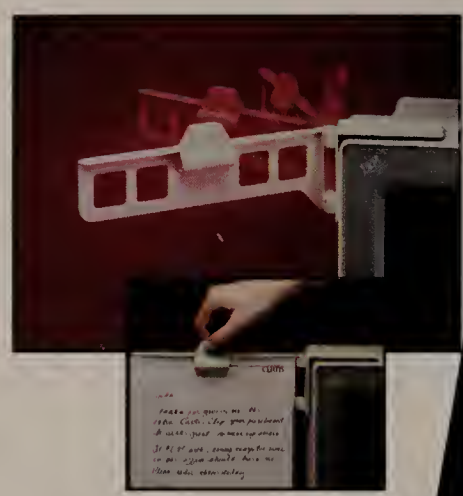

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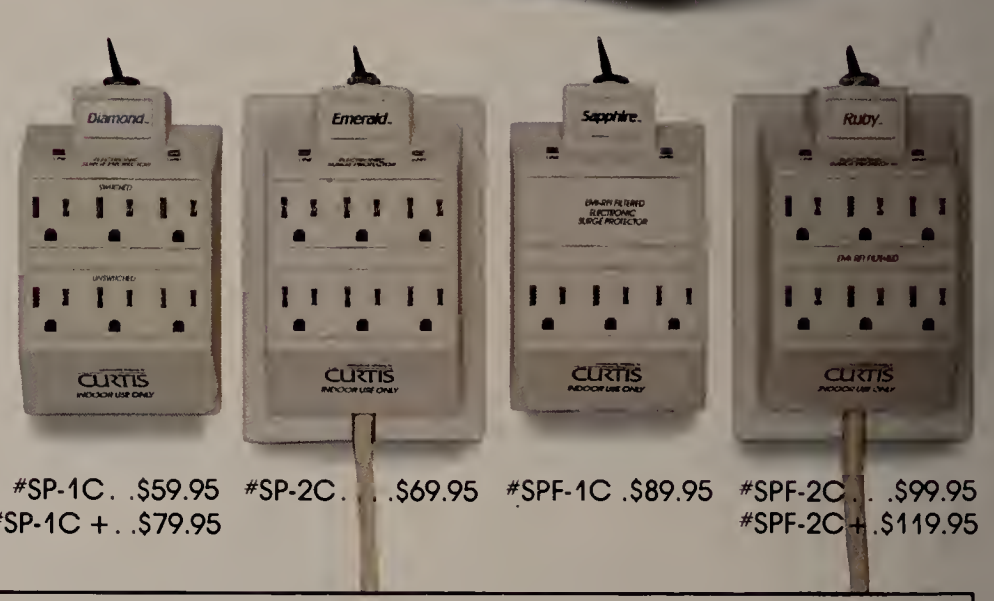

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